



Envision 2040

Final Report

March 2015

2015-2040
BISMARCK-MANDAN
Long Range Transportation Plan





Envision2040: Bismarck-Mandan Long Range Transportation Plan Update

March 2015

Report

Prepared by:



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Resolution of Adoption

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, the Planning and Zoning Commission for each of the five jurisdictions has reviewed and forwarded to their respective commission/council a favorable recommendation of the 2015-2040 Long Range Transportation Plan; and

Whereas, all affected governing bodies (Bismarck, Mandan, Lincoln, Burleigh County and Morton County) have approved the Plan; and

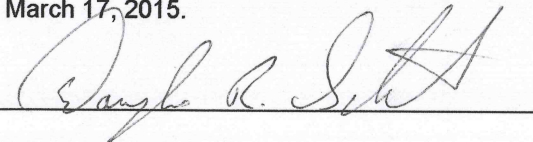
Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and have indicated their support;

Now Therefore be it Resolved, by the Bismarck-Mandan Metropolitan Planning Organization Policy Board that it adopts the 2015-2040 Long Range Transportation Plan and directs staff to publish the final document and distribute copies as appropriate; and

Be it Further Resolved, that all jurisdictions and their elected officials and staff will cooperatively implement the 2015-2040 Long Range Transportation Plan elements.

CERTIFICATE

The undersigned, duly elected chairperson of the Bismarck-Mandan Metropolitan Planning Organization Policy Board certifies that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Bismarck-Mandan Metropolitan Planning Organization Policy Board held on March 17, 2015.



Douglas R. Schonert
Chairman, Bismarck-Mandan MPO Policy Board

MARCH 17, 2015

Date

Resolution of Adoption

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, Morton County staff have actively participated in Plan development and have had the opportunity to review the 2015-2040 Long Range Transportation Plan, and any comments received have been addressed within the Plan; and

Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and any comments received have been addressed within the Plan; and

Whereas, notices were published for each jurisdiction's Planning Commission public hearings in accordance with the MPO Public Participation Plan, and the Planning Commissions of each jurisdiction have held public hearings on and reviewed the 2015-2040 Long Range Transportation Plan and have approved it as a guide for their future planning and development policies, and have recommended it to the Morton County Commission; and

Now Therefore be it Resolved, by the Morton County Commission that it adopts the 2015-2040 Long Range Transportation Plan; and

Be it Further Resolved, that Morton County staff are directed to implement the 2015-2040 Long Range Transportation Plan.

CERTIFICATE

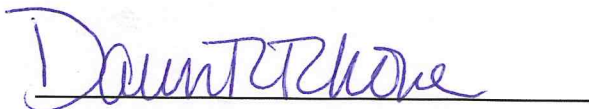
The undersigned representatives of Morton County certify that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Morton County Commission held on January 27, 2015.



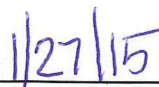
Bruce Strinden,
Chairman, Morton County Commission



Date



Dawn Rhone,
Auditor, Morton County



Date

Resolution of Adoption

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, City of Mandan staff has actively participated in Plan development and has had the opportunity to review the 2015-2040 Long Range Transportation Plan, and any comments received have been addressed within the Plan; and

Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and any comments received have been addressed within the Plan; and

Whereas, notice was published for a public hearing in accordance with the MPO Public Participation Plan, and the Mandan Planning Commission held a public hearing on the 2015-2040 Long Range Transportation Plan and has approved it as a guide for their future planning and development policies, and has recommended it to the Mandan City Commission; and

Now Therefore be it Resolved, by the Mandan City Commission that it adopts the 2015-2040 Long Range Transportation Plan; and

Be it Further Resolved, that City of Mandan staff is directed to implement the 2015-2040 Long Range Transportation Plan.

CERTIFICATE

The undersigned representatives of the City of Mandan certify that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Mandan City Commission held on February 3, 2015.

By: _____

Arlyn Van Beek,
President, Mandan City Commission

_____ 2/3/15
Date

Attest: _____

Jim Neubauer,
Administrator, City of Mandan

_____ 2/3/15
Date

Resolution of Adoption

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, City of Lincoln staff has actively participated in Plan development and has had the opportunity to review the 2015-2040 Long Range Transportation Plan, and any comments received have been addressed within the Plan; and

Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and any comments received have been addressed within the Plan; and

Whereas, notice was published for a public hearing in accordance with the MPO Public Participation Plan, and the Lincoln Planning Commission held a public hearing on the 2015-2040 Long Range Transportation Plan and has approved it as a guide for their future planning and development policies, and has recommended it to the Lincoln City Council; and

Now Therefore be it Resolved, by the Lincoln City Council that it adopts the 2015-2040 Long Range Transportation Plan; and

Be it Further Resolved, that City of Lincoln staff is directed to implement the 2015-2040 Long Range Transportation Plan.

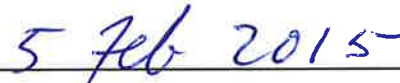
CERTIFICATE

The undersigned representatives of the City of Lincoln certify that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Lincoln City Council held on February 5, 2015.



Robert W. Johnston,
Mayor, City of Lincoln

Date



Roberta Unterseher,
Auditor, City of Lincoln

Date



Resolution of Receipt

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, City of Bismarck staff has actively participated in Plan development and has had the opportunity to review the 2015-2040 Long Range Transportation Plan, and any comments received have been addressed within the Plan; and

Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and any comments received have been addressed within the Plan; and

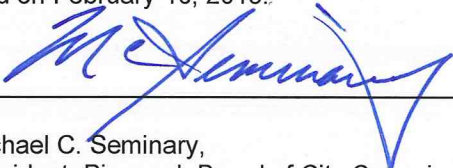
Whereas, notice was published for a public hearing in accordance with the MPO Public Participation Plan, and the Bismarck Planning and Zoning Commission held a public hearing on the 2015-2040 Long Range Transportation Plan and has approved it as a guide for their future planning and development policies, and has recommended it to the Bismarck Board of City Commissioners; and

Now Therefore be it Resolved, by the Bismarck Board of City Commissioners that it receives the 2015-2040 Long Range Transportation Plan; and

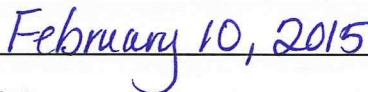
Be it Further Resolved, that City of Bismarck staff is directed to implement the 2015-2040 Long Range Transportation Plan.

CERTIFICATE


The undersigned representatives of the City of Bismarck certify that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Bismarck Board of City Commissioners held on February 10, 2015.



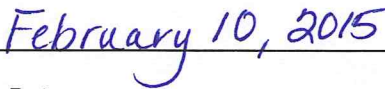
Michael C. Seminary,
President, Bismarck Board of City Commissioners



Date



W. C. Wocken,
Administrator, City of Bismarck



Date

Resolution of Adoption

For the 2015-2040 Bismarck-Mandan Long Range Transportation Plan

Whereas, the U.S. Department of Transportation requires the development, approval, and maintenance of a Long Range Transportation Plan for the Bismarck-Mandan Metropolitan Planning Organization (MPO) as a condition of Federal transportation funding; and

Whereas, the MPO has been designated by the Governor of North Dakota as the organization responsible for preparing and maintaining the Long Range Transportation Plan; and

Whereas, the MPO after an extensive public and stakeholder involvement process and substantial consideration of technical, environmental, financial, and social factors has prepared the 2015-2040 Long Range Transportation Plan which is in compliance with Federal and State transportation planning guidance; and

Whereas, Burleigh County staff has actively participated in Plan development and has had the opportunity to review the 2015-2040 Long Range Transportation Plan, and any comments received have been addressed within the Plan; and

Whereas, all relevant State and Federal agencies have had the opportunity to review the Plan and any comments received have been addressed within the Plan; and

Whereas, notice was published for a public hearing in accordance with the MPO Public Participation Plan, and the Burleigh County Planning Commission held a public hearing on the 2015-2040 Long Range Transportation Plan and has approved it as a guide for their future planning and development policies, and has recommended it to the Burleigh County Commission; and

Now Therefore be it Resolved, by the Burleigh County Commission that it adopts the 2015-2040 Long Range Transportation Plan; and

Be it Further Resolved, that Burleigh County staff is directed to implement the 2015-2040 Long Range Transportation Plan.

CERTIFICATE

The undersigned representatives of Burleigh County certify that the forgoing is true and correct copy of a Resolution, adopted at a legally convened meeting of the Burleigh County Commission held on February 18, 2015.



Douglas R. Schonert,
Chairman, Burleigh County Commission

2/18/15
Date



Kevin J. Glatt,
Auditor/Treasurer, Burleigh County

2/18/15
Date

Chapter 1 INTRODUCTION

The Bismarck-Mandan Metropolitan Planning Organization (MPO) is a consortium of five jurisdictions:

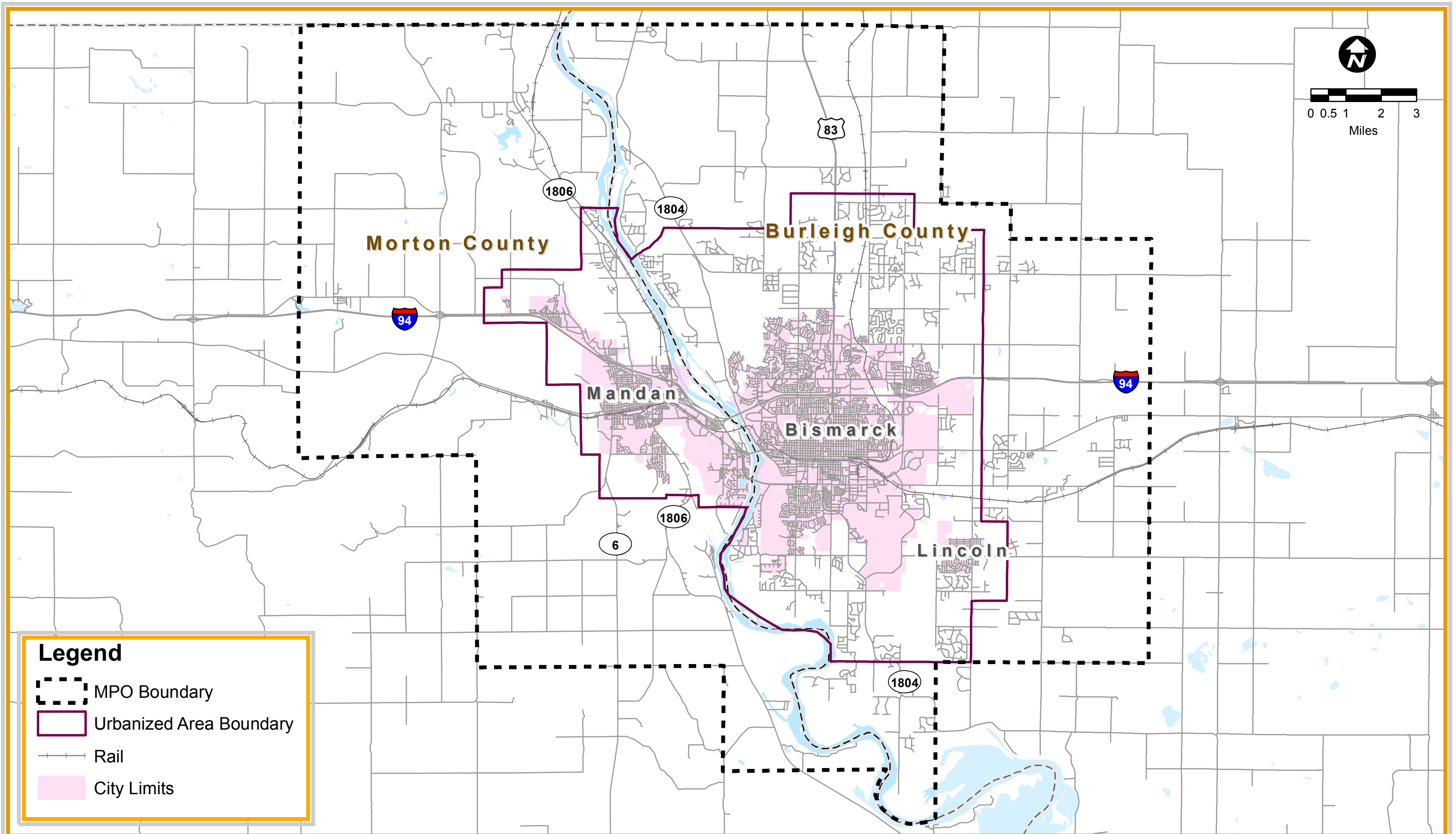
- *City of Bismarck*
- *City of Mandan*
- *City of Lincoln*
- *Part of Burleigh County*
- *Part of Morton County*

The Bismarck-Mandan metropolitan area, home to the state Capitol and many major employers and colleges and universities, has recently experienced a rapid increase in the pace of development. The metropolitan area's 2013 US Census population estimate is 117,441, an increase of nearly 8% in just three years. The study area is documented in **Figure 1-1**.

Federal law requires that every urbanized area with a population of 50,000 or more people must be represented by an MPO, which carries out the metropolitan transportation planning process for the urbanized area and surrounding areas. The MPO is the Bismarck-Mandan urbanized area's forum for a "continuing, cooperative, and comprehensive" regional transportation planning process (called the 3C process), which helps shape a more integrated and multimodal metropolitan transportation system. The MPO is composed of two main committees:

- The Technical Advisory Committee (TAC), which is comprised of planning, engineering, and administrative staff from the member jurisdictions, the public transportation provider, North Dakota Department of Transportation, Federal Highway Administration, and an individual representing freight interests. The TAC provides professional assessment and recommendations for the MPO's Policy Board.
- The Policy Board is a five member board comprised of the mayors of Bismarck, Lincoln, and Mandan, and a commissioner from each Burleigh and Morton Counties. The Policy Board is the decision-making body of the MPO.

As required by the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) authorization, every metropolitan planning organization is required to have a transportation planning process in place in order to receive Federal transportation funding. Part of that process is to have a Long Range Transportation Plan (LRTP) that provides guidance for selecting a fiscally-constrained set of transportation policies, projects and programs for at least the next 20 years. The LRTP must be updated every five years.



The MPO *2015-2040 Bismarck-Mandan Long Range Transportation Plan* update was branded as “Envision 2040” plan for many of the public engagement efforts. In this document, the *2015-2040 Bismarck-Mandan Long Range Transportation Plan* is called the “2040 LRTP” for simplicity and consistency. The purpose of the 2040 LRTP is to:

- **Establish a community vision** for the LRTP by engaging community members to understand the community’s transportation concerns and identifying opportunities for improved regional travel.
- **Evaluate current and long-term mobility, accessibility, and safety performance** and identify issue locations that do not meet locally-established performance standards.
- **Address all modes of travel**, including personal vehicle, bus / transit, bicycle and pedestrian.
- **Develop and test a range of improvement strategies, programs and projects** (called “alternatives”) that address identified mobility and accessibility needs while fitting within the community fabric. These strategies and projects are tested against performance measures consistent with Federal requirements and are tailored to fit within the community vision.
- **Develop a prioritized, financially-constrained implementation plan** for transportation investments through 2040.

Measuring **transportation system performance** is a significant component of transportation planning under MAP-21. The *2015-2040 Bismarck-Mandan Long Range Transportation Plan* has incorporated performance measurement consistent with the available guidance from MAP-21. The requirements for performance measurement have been and are continuing to be established during the development of this transportation plan. Where possible, this plan has used the performance measurement perspectives provided in MAP-21, and is providing a solid baseline for continued performance monitoring and assessment in the metropolitan area.

As shown in **Figure 1-2**, the MPO’s 2040 LRTP is a key initial step in the overall regional transportation planning process. The last step in the process is monitoring system performance. Monitoring is an ongoing activity that future LRTP updates will use to evaluate how well the planning activities, programs, and projects implemented by the MPO are meeting the metropolitan area, State, and Federal goals. More discussion of MAP-21 implementation is provided in *Chapter 10*.

Figure 1-2. Role of the Long Range Transportation Plan



Sources: *Model Long-Range Transportation Plans: A Guide for Incorporating Performance-Based Planning*, FHWA, August 2014, Bismarck-Mandan MPO

Chapter 2 TRANSPORTATION VISION, GOALS AND OBJECTIVES

2.1 TRANSPORTATION VISION

To gain an understanding of the unique vision that the Bismarck-Mandan community has for its transportation system, the 2040 LRTP included an extensive outreach and engagement process. More details on the public engagement effort are provided in *Chapter 3*. The community's transportation vision is reflected in the goals and objectives that were developed for the 2040 LRTP. The vision provides the framework for the LRTP by establishing the perspectives by which the community views the system, its problems and its potential solutions.

How the Transportation Vision Elements Fit within the LRTP



2.2 GOALS AND OBJECTIVES

Goals and objectives for the 2040 LRTP are based on feedback received from the LRTP study management team, public workshops, and the MPO Technical Advisory Committee and Policy Board members. The goals and objectives have been crafted to reflect:

- Input received at September 2013 Stakeholder meetings, January 2014 public workshops, the information and comment kiosk stations located across the community, the study website, and via the Community Transportation Survey.
- Guidance provided by Federal transportation authorization.

2.2.1 MAP-21 NATIONAL PERFORMANCE GOALS

Congress passed the Moving Ahead for Progress in the 21st Century (MAP-21) legislation in June 2012, which is the current surface transportation authorization that



establishes Federal funding and policy direction. MAP-21 established national performance goals for the Federal-Aid highway program in seven areas¹:

- **Safety:** To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure condition:** To maintain the highway infrastructure asset system in a state of good repair.
- **Congestion reduction:** To achieve a significant reduction in congestion on the National Highway System.
- **System reliability:** To improve the efficiency of the surface transportation system.
- **Freight movement and economic vitality:** To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental sustainability:** To enhance the performance of the transportation system while protecting and enhancing the natural environment.
- **Reduced project delivery delays:** To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

2.2.2 MAP-21 PLANNING FACTORS

The Federally-defined scope of the metropolitan transportation planning process is that "The metropolitan transportation planning process shall be continuous, cooperative, and comprehensive, and provide for consideration and implementation of projects, strategies, and services that will address the following factors:

- (1) *Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;*
- (2) *Increase the safety of the transportation system for motorized and non-motorized users;*
- (3) *Increase the security of the transportation system for motorized and non-motorized users;*
- (4) *Increase accessibility and mobility of people and freight;*
- (5) *Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;*
- (6) *Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;*
- (7) *Promote efficient system management and operation; and*
- (8) *Emphasize the preservation of the existing transportation system.*²

¹ 23 USC 150(b)

² 23 CFR 450.306

2.2.3 NDDOT TransAction III

TransAction III, North Dakota's Statewide Strategic Transportation Plan (2012) is the guiding document for the North Dakota DOT that provides direction for the continued development of the state transportation system. The TransAction III plan provides the following vision: "North Dakota's multimodal transportation system is strategically developed and globally integrated." The goals outlined in TransAction III for the transportation system are:

- Safe and Secure Transportation System
- Sustainable and Reliable Mobility
- Diversified and Sufficient Funding
- Communication and Cooperation
- Strong Economic Growth with Consideration of Environmental, Cultural, and Social Impacts

2.2.4 2040 LRTP BISMARCK-MANDAN TRANSPORTATION GOALS AND OBJECTIVES

Combining the federal guidance with input from the public, LRTP management team, MPO Technical Advisory Committee and Policy Board members resulted in a defined and comprehensive vision for the Bismarck-Mandan metropolitan area. The goals and objectives developed for the transportation plan are provided on the next page.

<p><u>Goal 1:</u> Maintain and Improve Regional Mobility and Connections</p>	<ul style="list-style-type: none"> • Objective 1A: Implement projects and programs that reduce travel delays. • Objective 1B: Leverage the existing transportation system by emphasizing low-cost, low-impact solutions that may include incremental system improvements, system preservation, and technology applications. • Objective 1C: Provide and maintain corridors that facilitate longer-distance travel within the region. • Objective 1D: Improve the continuity of the multimodal system through improved network connections and reduction of system gaps. • Objective 1E: Manage and plan for a street and highway system that provides an appropriate functional balance of land access and travel mobility.
<p><u>Goal 2:</u> Enhance Regional Alternatives to Automobile Travel</p>	<ul style="list-style-type: none"> • Objective 2A: Improve transit route efficiency, system productivity, and community awareness. • Objective 2B: Improve transit and rideshare opportunities for travelers commuting into Bismarck-Mandan from outside the urban area. • Objective 2C: Ensure reliable public transit service that is easily understandable to the public. • Objective 2D: Create multimodal connections between bicycle, pedestrian, automobile, and transit travel. • Objective 2E: Improve bicycle and pedestrian system accessibility and connectivity opportunities while maintaining safety. • Objective 2F: Improve the awareness and safety of bicycling, and educate both bicyclists and motorists on rules and responsibilities.
<p><u>Goal 3:</u> Maintain the Transportation System in a State-of-Good-Repair</p>	<ul style="list-style-type: none"> • Objective 3A: Maintain pavement quality and bridges at acceptable levels. • Objective 3B: Improve street signage and visibility. • Objective 3C: Maintain the current bicycle and pedestrian system. • Objective 3D: Maintain transit fleet, equipment, and facilities in a state-of-good-repair.
<p><u>Goal 4:</u> Coordinate Transportation Planning with the Natural and Built Environment</p>	<ul style="list-style-type: none"> • Objective 4A: Promote transportation investments that support infill, mixed use development patterns. • Objective 4B: Provide transportation infrastructure design guidance that fits within the context of the built environment. • Objective 4C: Plan for and address multimodal transportation system impacts / sufficiency when planning new developments. • Objective 4D: Minimize the transportation system's impacts on the natural and built environment. • Objective 4E: Ensure that mobility-challenged populations, such as low income, disabled, and senior citizens, have travel options in the region.
<p><u>Goal 5:</u> Provide a Transportation System that Effectively Moves Goods and Enhances the Local Economy</p>	<ul style="list-style-type: none"> • Objective 5A: Enhance the efficient and safe movement of freight and goods. • Objective 5B: Manage freight movement's impacts on the community, including addressing the movement of hazardous materials through the region. • Objective 5C: Promote transportation investments that enhance the local economy.
<p><u>Goal 6:</u> Provide a Safe and Secure Transportation System</p>	<ul style="list-style-type: none"> • Objective 6A: Reduce the incidence of all multi-modal crashes, with an emphasis on serious injury and fatal crashes and crash locations • Objective 6B: Provide a safe and secure environment for transit system riders. • Objective 6C: Enhance transportation security and reliability by developing strategies to address critical transportation assets identified.
<p><u>Goal 7:</u> Identify Transportation-Supportive Funding and Policy Opportunities</p>	<ul style="list-style-type: none"> • Objective 7A: Identify non-traditional funding opportunities to support transportation needs. • Objective 7B: Develop policies to support consistent application of development-related improvement requirements and streamlined project development.

Chapter 3 PUBLIC ENGAGEMENT PROCESS

The MPO updated the 2015-2040 Long Range Transportation Plan within the context of a multi-faceted, active, and on-going public engagement effort. The goal of the engagement campaign was to build awareness of the 2040 LRTP within the community as a whole, and to provide multiple avenues to broadcast information to the community, while providing a range of convenient ways for the public to provide input on plan development. Community engagement efforts focused on traditional methods and innovative technological methods. There were four key milestones where public engagement efforts actively solicited public input:

Transportation Issues Collection / Vision Development

Transportation Opportunities / Alternatives Development

Alternatives Assessment

Draft Transportation Plan

3.1 COMMUNITY SURVEY

In support of the 2040 LRTP, the study team enlisted a survey firm to administer an MPO-wide household survey during the winter of 2013-2014. This is the first “Regional Travel” survey that was completed for the Bismarck-Mandan MPO study area. The survey was administered by mail, phone and online to a random sample of 632 residents in the Bismarck-Mandan MPO study area. The results for the random sample of 632 respondents have a 95% level of confidence with a precision of at least +/- 3.9%, which suggest a relatively high degree of reliability. The results of the survey were then weighted to reflect the population distribution of the distribution across the MPO study region.

3.1.1 SURVEY OVERVIEW

- **Perceptions of Current Transportation Issues**
 - Approximately 82% of those surveyed indicated that they were satisfied or very satisfied with the maintenance of Interstate 94 (I-94).
 - Nearly 79% were satisfied with the flow of traffic during non-peak times.
 - 72% were satisfied with the ease of traveling between Bismarck and Mandan.
 - Transportation issues with the lowest satisfaction were:

- flow of traffic during peak times
- availability of parking
- amount of truck traffic
- train crossings
- ease of North-South travel
- **Transportation Issues That Are the Most Important to Address**
Respondents were asked to identify which transportation issues they thought were the most important to address, and top four issues to address were:
 - flow of traffic at peak times
 - maintenance of current roads, in and around Bismarck-Mandan
 - ease of North-South travel
 - availability of parking
- **Corridors as top priorities for improvement in Burleigh County**
Respondents were asked to identify corridors that they thought should be top priorities for improvement in Burleigh County. The top three responses were:
 - Washington Street
 - 43rd Avenue
 - Divide Avenue
- **Corridors as top priorities for improvement in Morton County**
Respondents were asked to identify corridors that they thought should be top priorities for improvement in Morton County. The top four responses were:
 - Old Red Trail
 - Memorial Highway
 - Sunset Drive
 - Collins Road
- **Rate the Bismarck-Mandan area roadway and street system.**
Respondents were asked to rate the overall Bismarck-Mandan area roadway and street system.
 - "Excellent" = 5%
 - "Good" = 44%
 - "Average" = 43%
 - "Poor" = 9%

The full results of the Community survey are provided in [Appendix A](#).

3.2 FOCUS GROUP

The focus group was a cross-section of community members, established to act as a sounding board for the community that reconvened at key milestones to provide feedback



to the 2040 LRTP team. Members of the focus group included:

- Economic Development and Professional Organizations
- Local Universities and Colleges
- Public Schools
- Health Care
- First Responders / Police and Fire
- Parks and Recreation
- Transit Interests
- Bicycle Interests
- AARP

The focus group met four times throughout the 2040 LRTP. The focus group provided input on the issues and vision for the study, ideas for projects and programs to include in the alternatives development, and the alternatives assessment. The focus group also held a special presentation of the draft plan during the final phase of the project.

3.3 PUBLIC MEETINGS

Three sets of public meetings were held throughout the 2040 LRTP process. At each set of meetings, one meeting was held in Bismarck, and one in Mandan.

- The first set of public meetings was held in January 2014. These meetings were conducted in a workshop format, where a brief overview of the study was given to those in attendance, followed by small group exercises where attendees supplied input on location-specific and regional-scale issues and opportunities. Large maps and markers were used for the small groups to record their transportation hot-spots, issues, and opportunities. Separate maps were provided for meeting participants to record roadway, bicycle and pedestrian, and transit issues.
- At the time of the first public meeting, an additional presentation was made for televising on Dakota Media Access' Government Access Channel 2 in Bismarck and Mandan. The presentation provided an overview of the LRTP, discussed the feedback received to that date, and provided information on ways those watching at home could get involved in the 2040 LRTP and provide input.
- The second set of public meetings was held in September 2014. The alternatives assessment was presented at this meeting, and the public was offered the opportunity to communicate their comments and ask questions about the alternatives.



- The third set of public meetings will be held at the planning commission and City / County Commission meetings as hearings on presentation of the draft 2015-2040 Long Range Transportation Plan. Presentations were made to:
 - Bismarck Planning Commission (January 28, 2015)
 - Bismarck City Commission (February 10, 2015)
 - Burleigh County Planning Commission (February 11, 2015)
 - Burleigh County Commission (February 18, 2015)
 - Lincoln Planning Commission (February 3, 2015)
 - Lincoln City Council (February 5, 2015)
 - Mandan Planning Commission (January 26, 2015)
 - Mandan City Commission (February 3, 2015)
 - Morton County Planning Commission (January 22, 2015)
 - Morton County Commission (January 27, 2015)

3.4 STEERING COMMITTEE

A steering committee was established to provide technical direction for LRTP development. Representation on the steering committee included:

- City of Bismarck
- City of Mandan
- Burleigh County
- Morton County
- Bis-Man Transit / Capital Area Transit
- FHWA
- Federal Transit Administration (FTA)
- NDDOT

3.5 SOCIAL MEDIA

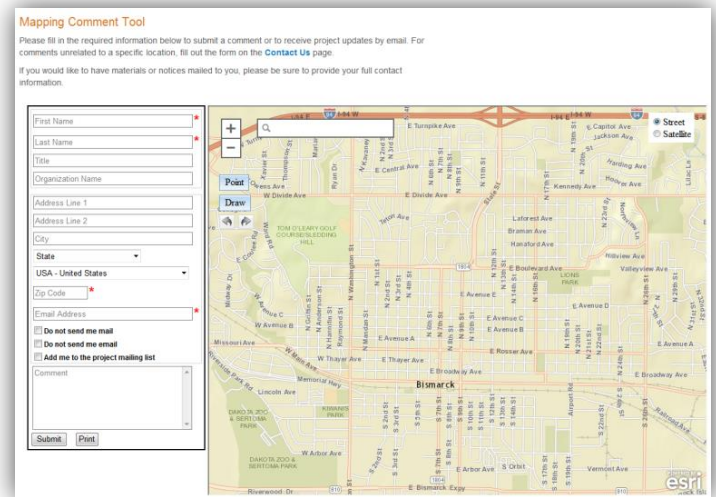
Facebook and Twitter were used to keep the community engaged in a convenient and routine manner. Posts related to study updates were provided as appropriate, along with posts about topics related to transportation planning and community development in general that were both pertinent and entertaining. The social media effort was not directed as a conversation method as much as it was an additional way to keep the public involved in the study, and to drive them to the study website at appropriate times to provide information and garner feedback.



3.6 PROJECT WEBSITE

The project website, EnvisionBisMan2040.com, was one of the primary means of providing information to the community and receiving feedback. Some of the key elements of the website included:

- A homepage that provided the latest updates on plan development, and key links for the public to get information and provide input.
- An “About” page that provided an overview of the plan update and some frequently-asked-questions.
- A “Get Involved” page that provided a comment mapping tool that allowed users to navigate to a location in the Bismarck-Mandan-Lincoln area, draw on the map and leave a comment specific to that location. This page also allowed users to link to a “Contact Us” page where they could send the project team an email, link to social media outlets, fill out a comment form, sign up for the project mailing list, and obtain a mailing address for the project team.
- A “News” tab with the latest news and updates on the plan development.
- A “Resources” tab with the latest presentations, maps, and documents from the plan development team.



The comments received via the website during the course of the projects, along with more summaries of public engagement effort, are included in [Appendix B](#).

3.7 FEEDBACK RECEIVED

The LRTP study team received a wide range of input from the community on needs and ideas for the transportation system. Some of the feedback items were location-specific challenges or opportunities, while some were region-wide suggestions. The summaries of the feedback received are provided in [Appendix B](#) and include:

- Summary of Focus Group and Public workshop issues (mapped).
- Summaries of Website Comments Provided, including any mapped comments provided by the public.
- Summaries of public engagement correspondence.
- Presentations provided at public workshops.
- Comments received during the public draft review in November and December of 2014.

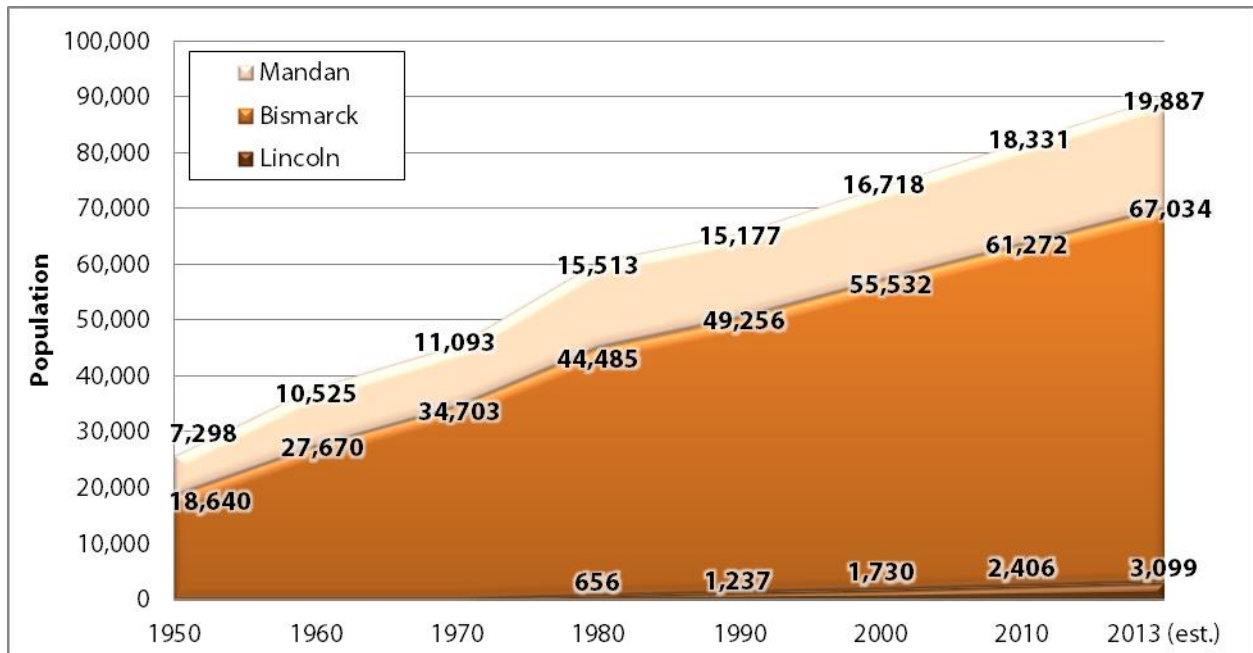
Chapter 4 CURRENT AND FUTURE LAND USE AND DEVELOPMENT

The Bismarck-Mandan area is currently experiencing rapid growth. The most recent data show that between July 2012 and July 2013, Bismarck-Mandan was the fifth fastest growing metropolitan area in the United States³. It is anticipated that relatively high levels of growth will continue into the future. Additional studies and reports have been recently completed or are underway that address this growth, including the *Bismarck Growth Management Plan* completed in 2014 and the ongoing *Mandan Land Use and Transportation Plan*. It is within this high growth context that the 2040 LRTP is being completed.

4.1 DEMOGRAPHIC TRENDS

The Bismarck-Mandan metropolitan area has experienced steady population growth in recent decades. Historical data on city population are available from the US Census and are provided in **Figure 4-1**, and provide a good illustration of how the MPO area has grown over the years.

Figure 4-1. Bismarck, Mandan and Lincoln Population Growth, 1950 to 2013



Source: US Census Bureau

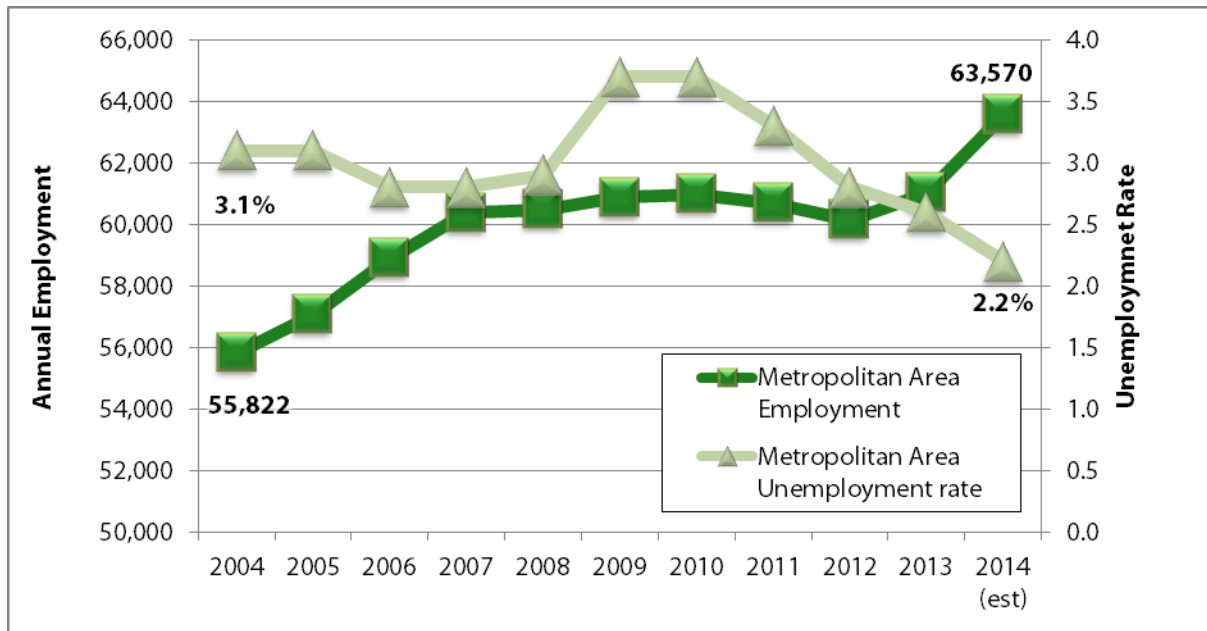
³ www.census.gov/newsroom/releases/pdf/CB14-51_countymetropopest2013tables.pdf

As shown in **Figure 4-1**, the cities have grown significantly since 1950. The city of Lincoln has grown from a single subdivision of 171 houses when first incorporated in 1977⁴ to a city with several businesses and a 2013 estimated population of 3,099.⁵ Burleigh and Morton Counties combined (of which the MPO area encompasses the vast majority of population, households, and employment) have grown over 160% since 1950, from a total population of 44,968 in 1950 to an estimated population of 117,447 in 2013.



Employment has grown steadily in the two-county area over the past several years. **Figure 4-2** illustrates the change in metropolitan area employment since 2004, including the regional unemployment rate.

Figure 4-2. Annual Employment Level and Unemployment Rate, Burleigh and Morton Counties Combined



Source: US Department of Labor, Bureau of Labor Statistics, Bismarck, ND Metropolitan Area.

4.2 EXISTING AND FUTURE LAND USE

For the purposes of the transportation plan, it is important to have an understanding of current land use patterns and development levels in the study area. How the Bismarck-Mandan area develops as a metropolitan area directly influences the demands placed on the transportation system. It is acknowledged that the connection between land use and transportation is a two-way street, as the location, supply and

⁴ *Comprehensive Plan*, City of Lincoln, ND, September 2012.

⁵ US Census Bureau, 2013 Population Estimates for Incorporated Places.

types / modes of transportation services available affects land development investment decisions. On the other hand, the location, density, and types of land development drive the transportation planning process. Thus, it is critical to understand existing land use patterns and trends to understand current demands on the system and be able to project future transportation system demands.

The base year conditions used for the 2040 LRTP travel demand modeling effort reflect base year 2010. More information on the travel demand model is provided in *Chapter 6*.

In 2012, the MPO worked with staff from local jurisdictions and utilized the best available data to develop projections of future households and employment through 2040. These study area development assumptions are a key input to the transportation plan update process, as the growth levels and locations drive multimodal transportation system demand estimates through 2040. The 2040 development projections were a two-step process:

- 1) The first step is to **develop the metropolitan area “control total” targets** for future household and employment levels. The control totals provide the summary of the total change in households and employment levels between the base year (2010) and 2040. Multiple growth scenarios were considered during the control total development process, due to the uncertainty and the high growth happening across the region and western North Dakota. The scenarios considered by the MPO were:
 - *Continued Steady Growth (Historic) Scenario*: Population growth at average regional historical growth rates of 1% to 1.5% per year through the 2040 planning horizon.
 - *Moderate Boom Scenario*: Population growth of 2.25% per year to 2025, returning to the regional historical rate of 1% to 1.5% per year after that to 2040.
 - *Aggressive Growth (Oil Boom) Scenario*: Population growth of 3.5% per year to 2025, returning to the regional historical rate of 1% to 1.5% per year to 2040.

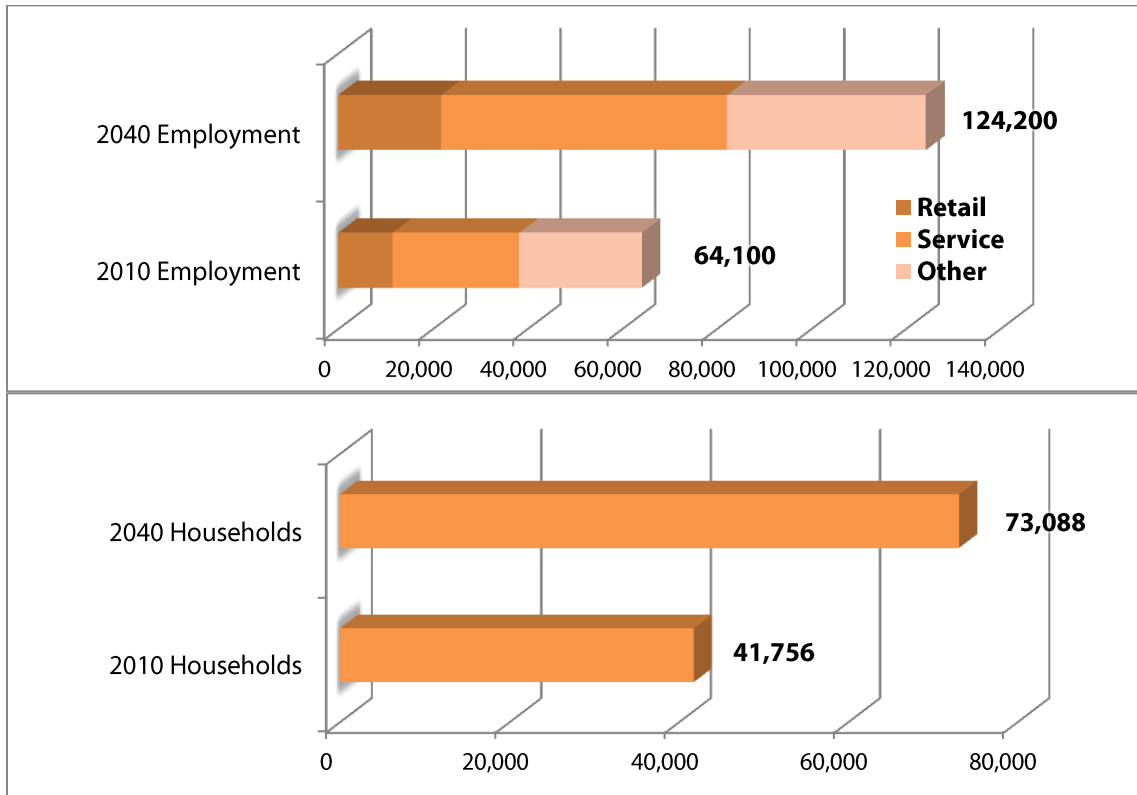
The MPO policy board selected the growth scenario called the “Aggressive Growth (Oil Boom) Scenario”. This scenario assumed a population / household growth rate of 3.5% per year through 2025, followed by a return to the historical growth rate of 1% to 1.5% per year through 2040.⁶ **Figure 4-3**

illustrates the levels of household and employment growth projected through 2040. Employment growth is further refined into three categories: retail employment, service employment, and other employment. As shown, it is expected that households will grow by approximately 75% and employment will grow by over 90% between 2010 and 2040.



⁶ Bismarck Growth Management Plan, April 2014.

Figure 4-3. Household and Employment Growth Projections, 2010 to 2040



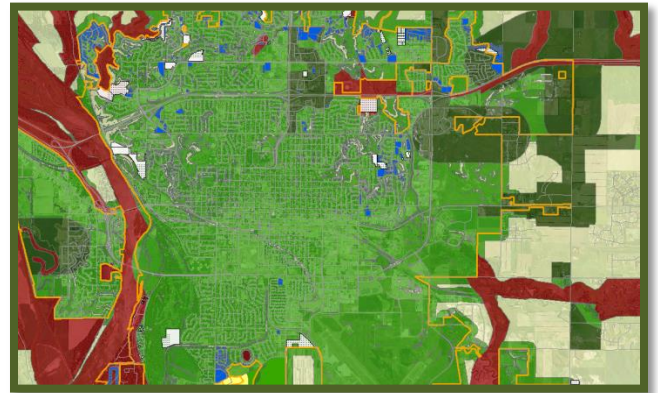
Source: Bismarck-Mandan MPO

- 2) Once the control totals were accepted, the second step was to **allocate the locations of future household and employment growth**. The process of allocation involved workshops with planning, engineering, and administrative officials from all five City and County jurisdictions within the MPO. To aid in the discussion, a development suitability model was created in ArcGIS Spatial Analyst. Separate suitability indices were created for various development types:

- Urban residential
- Rural residential
- Commercial/retail/service development
- Industrial development

Several factors were considered in the development suitability model, including:

- Proximity to water and sewer lines
- Proximity to existing and future streets
- Proximity to incorporated communities
- Slope

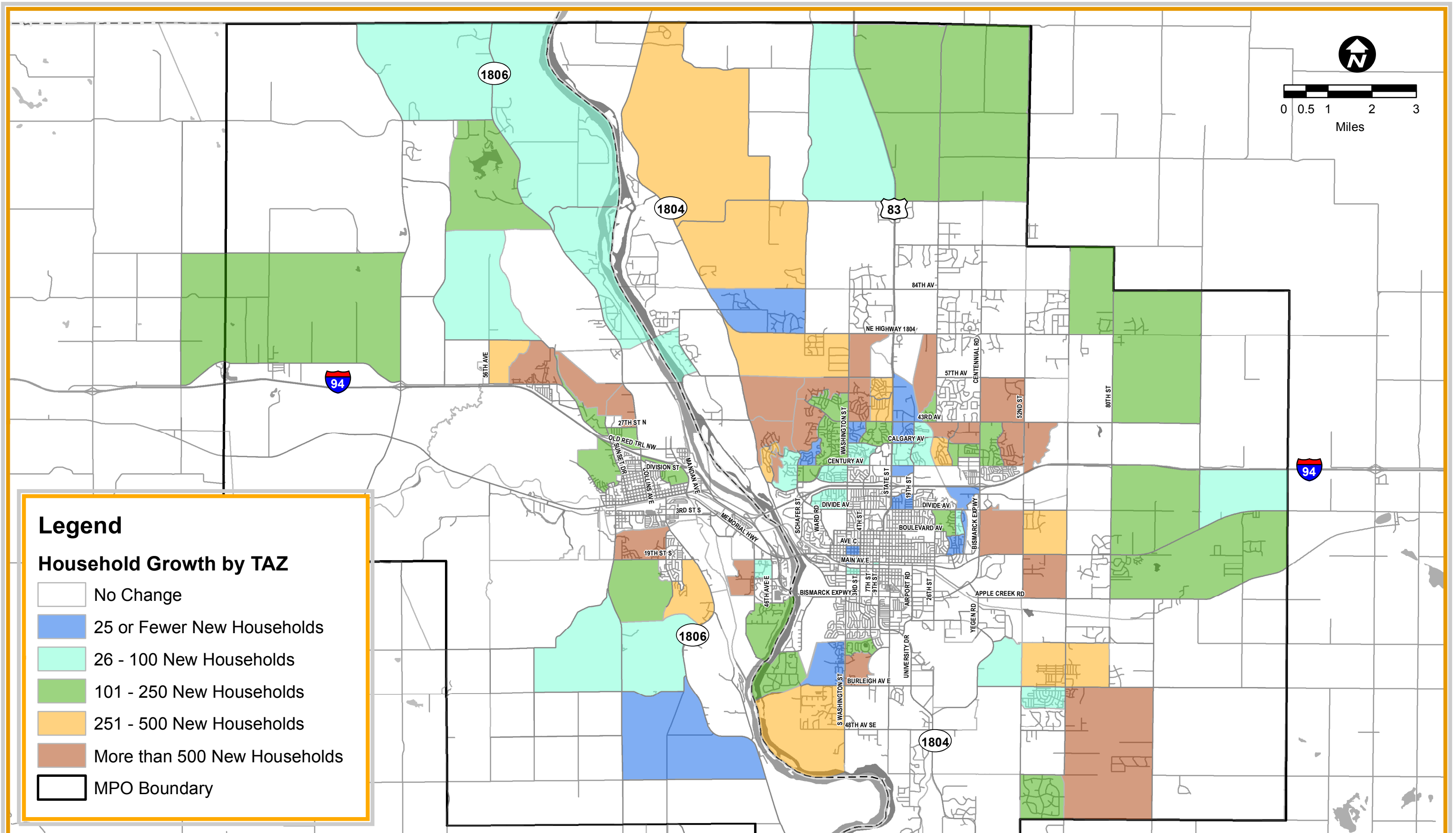


Source: Bismarck-Mandan MPO

- Known cultural resources
- Surface water/wetlands
- Floodplains
- Land uses identified by previous corridor / subarea studies

The resulting output identified a range of suitability for each land use type based on the criteria used. The suitability model results were shared in the development allocation workshops with representatives of the local jurisdictions to review. The suitability model results were a starting point and valuable reference for local staff, but were not the “final answer” in the process, as the model does not capture many of the human factors included in development. In the workshops, staff provided input on when each type of development was anticipated to happen through 2040, until the control totals were reached. Through the workshop process, the MPO and local planning and development staffs worked together and agreed on a likely future development allocation in each planning jurisdiction. The MPO policy board reviewed and approved the employment and household growth allocation used in the 2040 LRTP. The allocation of new housing units to the traffic analysis zone (TAZ) structure is shown in **Figure 4-4**. The allocation of new jobs to TAZs is shown in **Figure 4-5**.

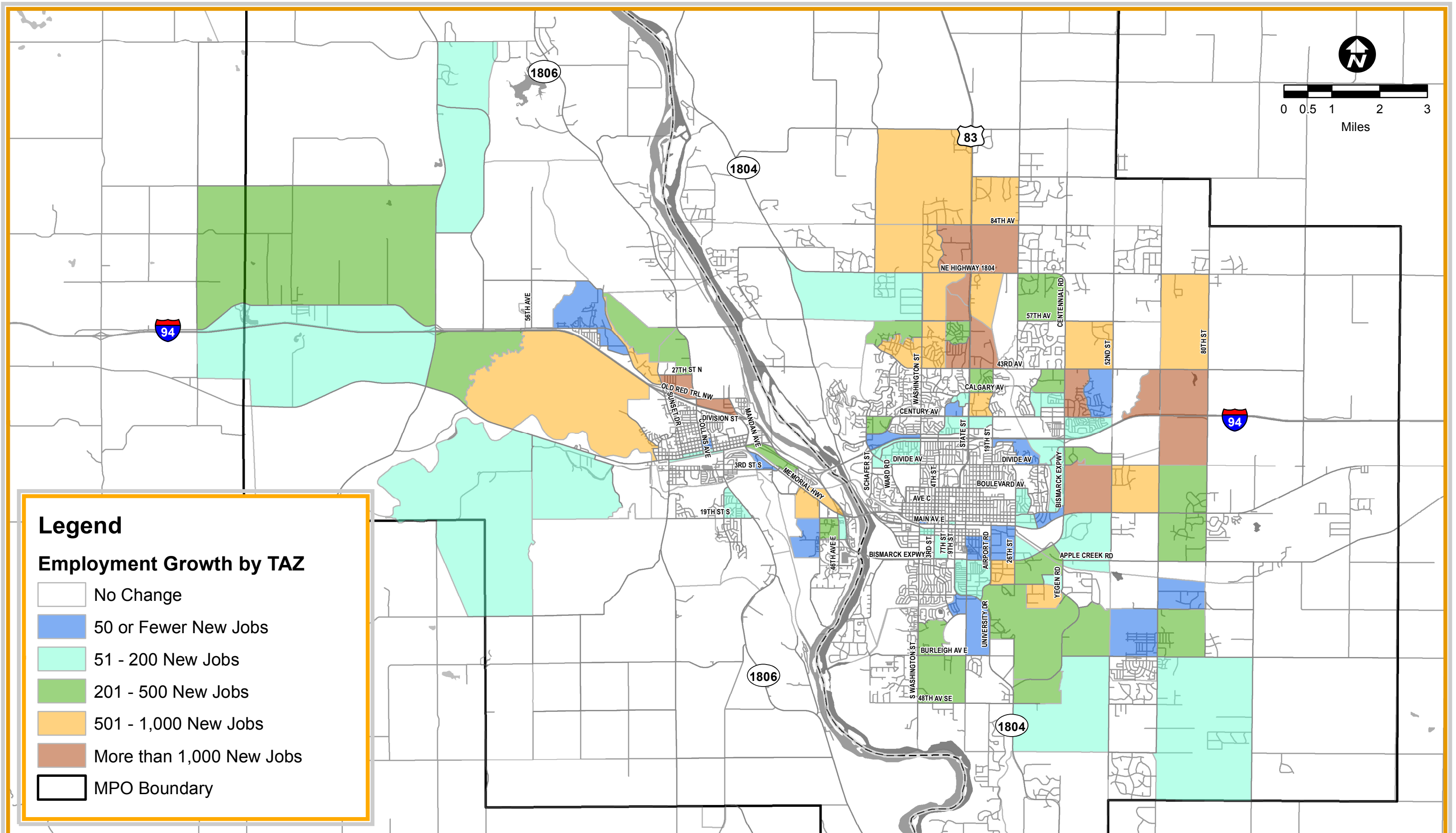
The 2040 household and employment data documented in this chapter were incorporated into the Bismarck-Mandan travel demand model to identify future transportation system demands and needs.



Forecasted Growth inHouseholds by Traffic
Analysis Zone, 2010 to 2040

Figure: 4-4

Date: November 2014



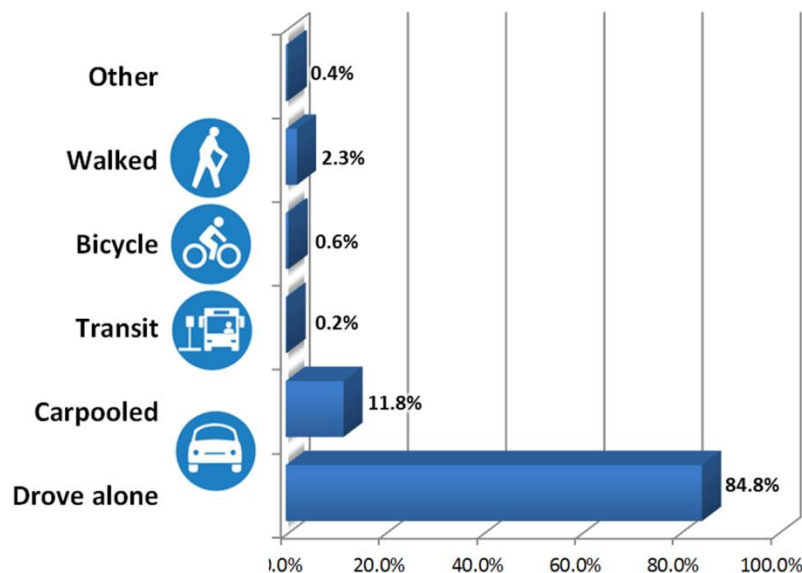
Chapter 5 EXISTING SYSTEM PERFORMANCE

The assessment of existing transportation system conditions includes assessments from several perspectives, including roadway system assessment, transit system assessment, and bicycle and pedestrian system assessment.

5.1 SYSTEM OVERVIEW

The current estimated usage for each of the modal systems for work trips is provided in **Figure 5-1**.

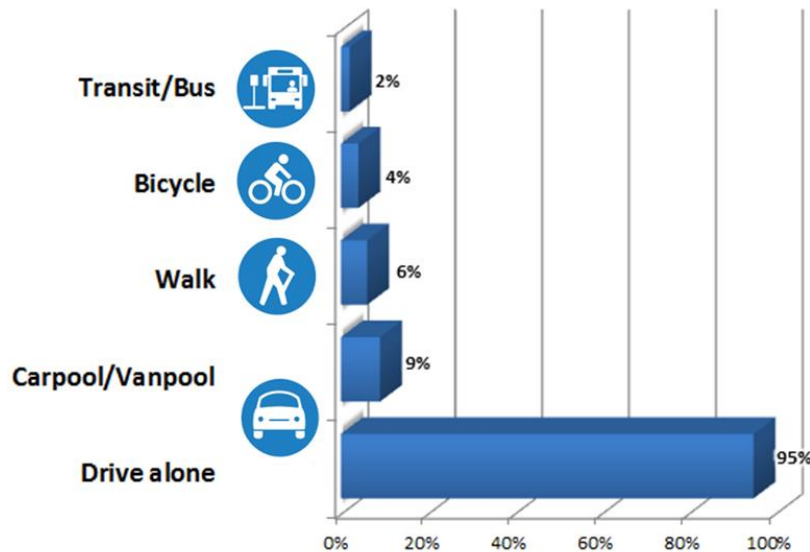
Figure 5-1. Current Estimated Modal Distribution of Work Trips, Bismarck-Mandan Metropolitan Area



Source: U.S. Census Bureau, 2008-2012 American Community Survey

The *Bismarck-Mandan Regional Travel Survey* asked respondents to identify what modes they typically used to make trips. **Figure 5-2** provides a summary of residents' responses to the modes they typically use for all trips, allowing multiple responses (which explains why the totals sum to over 100%) that represent the range of commute options people used.

Figure 5-2. Typical Modes Used by Bismarck-Mandan Residents for All Trips (Multiple Responses Allowed)

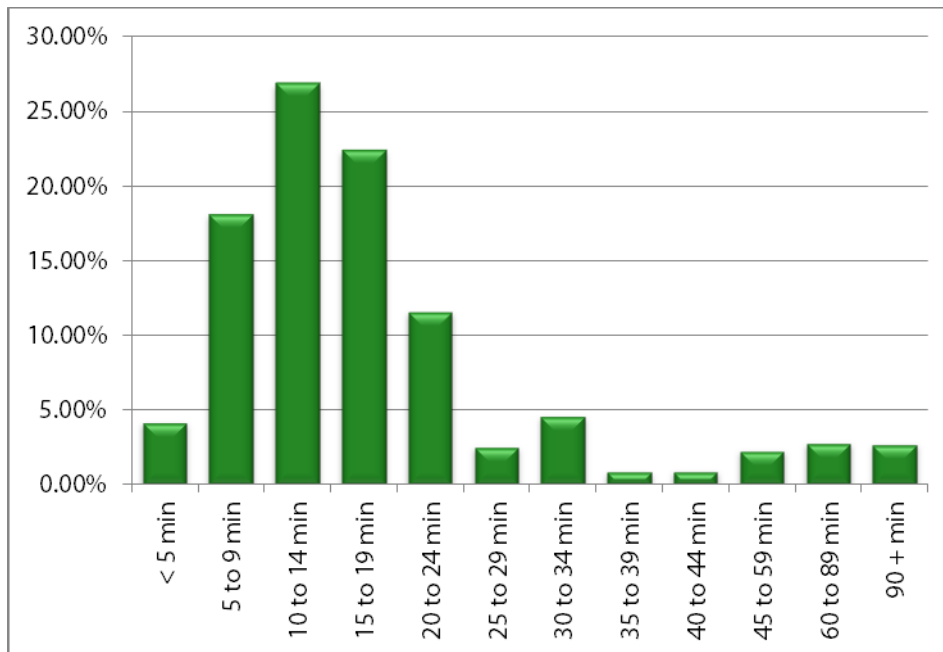


Source: 2013 Bismarck-Mandan Regional Travel Survey, ETC Institute

The latest information from the American Community Survey indicates that the average travel time to work for commuters that live in the Bismarck-Mandan metropolitan area is 18.7 minutes⁷. The distribution of work-based commute travel time is illustrated in **Figure 5-3**. As shown in **Figure 5-3**, the most common work travel time in the Bismarck-Mandan region is a 10 to 14 minute long commute. The average commute time is higher than the most common commute time as many commuters have longer trips of 30 minutes or more that increases the average time for study area residents.

⁷ Source: U.S. Census Bureau, 2008-2012 American Community Survey

Figure 5-3. Current Distribution of Travel Time to Work, Bismarck-Mandan Metropolitan Area



Source: U.S. Census Bureau, 2008-2012 American Community Survey

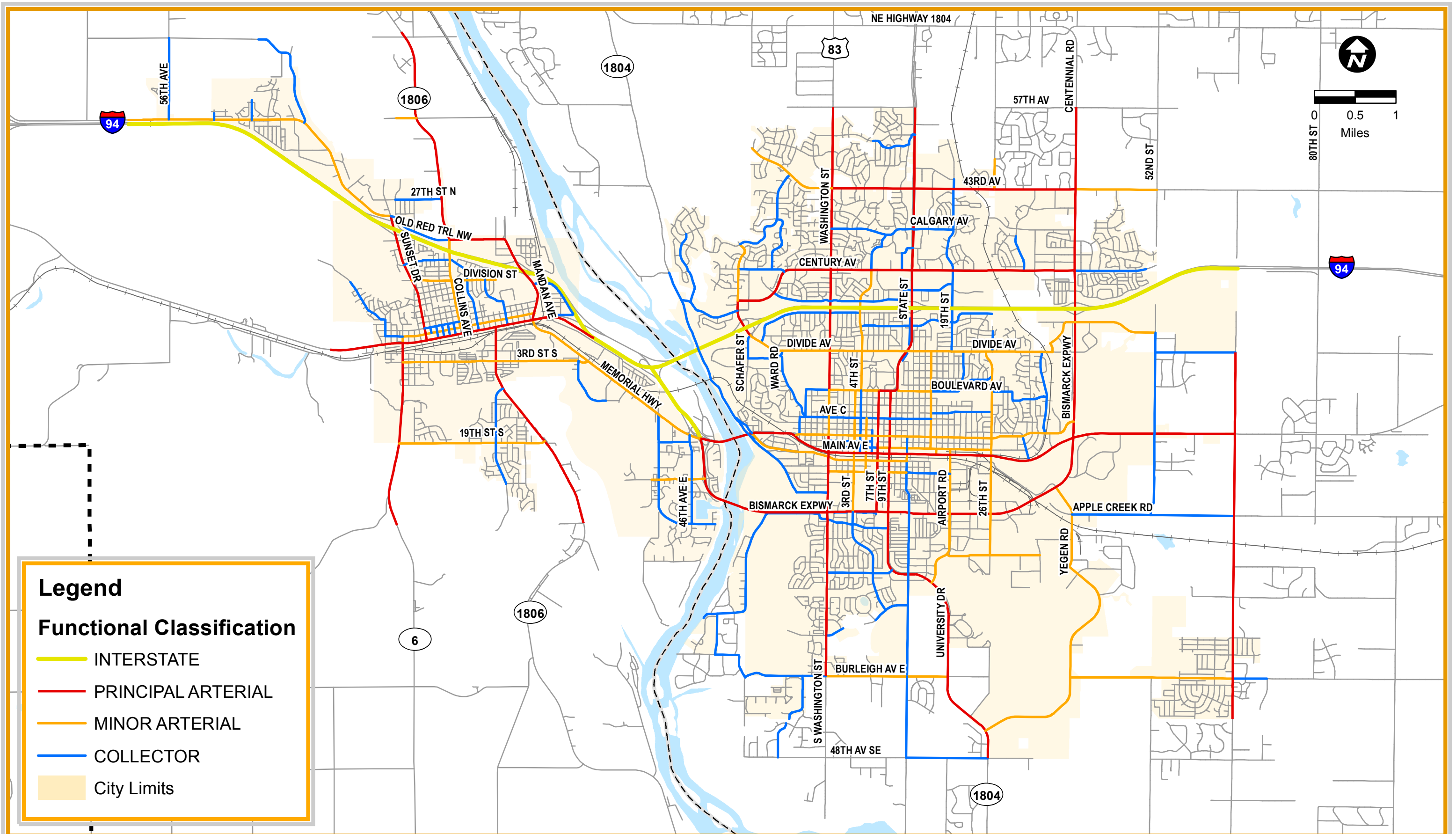
To understand overall commute patterns into and out of the MPO area, Longitudinal Employer Household Dynamics (LEHD) data from the US Census were evaluated. Data for 2011 were available and indicated that the Bismarck-Mandan MPO area is a net “importer” of workers, as more workers commute into the area from outside the MPO boundary than leave the area to work:

- Approximately 15,000 people resided outside of the Bismarck-Mandan area and commuted into the Bismarck-Mandan area for work.
- Approximately 10,600 people resided within the Bismarck-Mandan area and commuted outside of the Bismarck-Mandan area for work.

These measures provide an overview of travel in and around the Bismarck-Mandan area. The remainder of this chapter discusses the current performance of each modal system.

5.2 ROADWAY SYSTEM

The Bismarck-Mandan roadway system is illustrated in **Figure 5-4**, including the current roadway functional classification. Functional classification is a set of guidelines that group streets and roadways into classes, or systems. Through this approach, each roadway is put into categories that describe the character of the service they are intended to provide. **Figure 5-5** describes the various functional classes, including the level of mobility and land access they are intended to provide.



Legend

Functional Classification

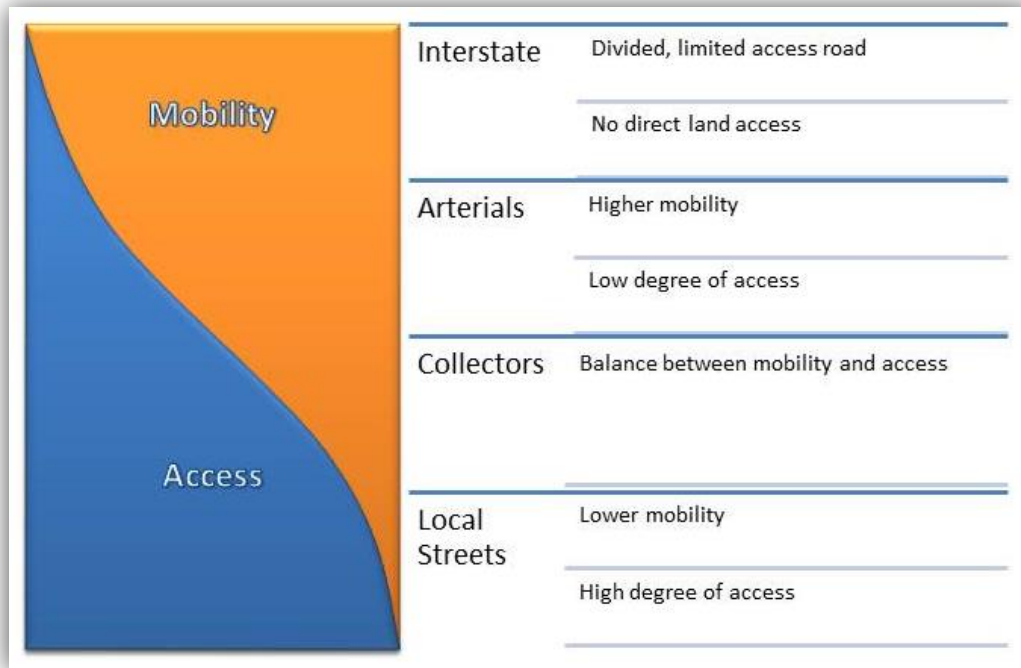
- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- COLLECTOR
- City Limits

Current Bismarck-Mandan MPO Roadway System
Functional Classification

Figure: 5-4

Date: December 2014

Figure 5-5. Traffic Mobility – Land Access Relation to Roadway Functional Classes



Source: US DOT, FHWA, *Flexibility in Highway Design*.

The functional classification system shown in **Figure 5-4** is for the urban system that the MPO is charged with classifying. **Table 5-1** provides the functional classification of urban centerline miles for the Bismarck-Mandan MPO study area compared to guidelines provided by the Federal Highway Administration (FHWA). As shown in the table, the mileage by functional classification in Bismarck-Mandan is generally consistent with FHWA recommendations.

Table 5-1. Bismarck-Mandan MPO Functionally Classified Roadways and FHWA Recommended Guidelines

Functional System	Length (Miles)	Percent of Total Network	FHWA Recommended Percent of Total Network Range
Local	652	77.10%	65-80%
Collector	67.2	7.90%	5-10%
Minor Arterial	51.4	6.10%	15-25%
Principal Arterial	59.4	7.00%	
Interstate	15.4	1.80%	NA
Total	845.4	100%	

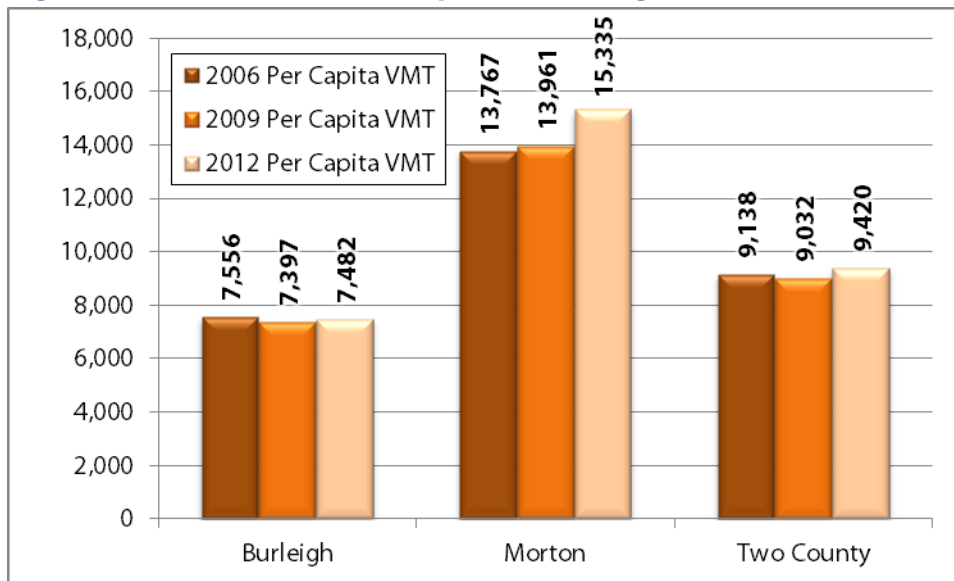
Source: Bismarck-Mandan MPO, *2012 Monitoring Report*

5.2.1 REGIONAL TRAVEL SUMMARY

One measure of transportation system performance is the level of vehicle miles traveled (VMT) and vehicle hours traveled (VHT). The 2012 *Bismarck-Mandan MPO Monitoring Report* provided a baseline for assessing regional travel performance with breakdowns of VMT and VHT. To account for changes in the population for each of the three reporting years, **Figure 5-6** provides the VMT statistics are normalized into annual VMT per capita. As with other assessments that present data for all of Burleigh and Morton counties, some of the travel reflected in this figure occurs outside of the MPO area. As shown, between 2006 and 2012 per capita VMT has remained relatively flat and declined somewhat overall in Burleigh County, while it has increased by approximately 11% in Morton County. While some of the increase in VMT per person may reflect increased personal driving (through either more trips or longer trips) of Morton County residents, given the increased oil activity just to the west and north of Morton County some of the increase is likely due to increases in travel through Morton County from non-residents.



Figure 5-6. Annual VMT Per Capita for Burleigh and Morton Counties, 2006-2012



Source: Bismarck-Mandan MPO, 2012 *Monitoring Report*.

VMT and VHT were evaluated with the Bismarck-Mandan travel demand model to estimate current levels by functional classification. This provides a baseline to determine how well the projects and programs assessed in later chapters for inclusion in the 20+ year LRTP implementation plan perform in terms of VMT and VHT. Note that the data provided in **Table 5-2** are based on travel model estimates within the MPO area (unlike **Figure 5-6** which represents the entire two county area) for streets classified as Collector, Arterial, or Interstate / Freeway.

Table 5-2. MPO Area VMT and VHT Estimate by Functional Class

Functional Class	Vehicle Miles Traveled	Vehicle Hours Traveled	Average System Speed
Interstate	260,662	4,943	52.7
Principal Arterials	688,300	18,301	37.6
Minor Arterials	314,106	9,367	33.5
Collectors	210,938	6,179	34.1
Total System	1,474,006	38,790	38.0

Source: ATAC, Bismarck-Mandan Travel Model

5.2.2 TRAFFIC MOBILITY AND OPERATIONS

An assessment of traffic operations is completed throughout the study area to gain an understanding of where locations of peak period congestion / delays exist. As the Bismarck-Mandan area has grown, it has begun to experience higher levels of peak period travel delay. Based on the results of the *Bismarck-Mandan Regional Travel Survey*, the flow of traffic during peak times had the highest level of reported dissatisfaction (53%) of the survey respondents.

Current traffic operations were assessed throughout the study area by combining the planning-level traffic analyses completed for the 2040 LRTP with detailed traffic studies recently completed in the study area.

The other studies used for this assessment include:

- ***I-94 Corridor Study Existing Conditions Report.***

The report provided summaries of level-of-service (LOS) for intersections adjacent to the I-94 corridor, based on Highway Capacity Manual (HCM) methodology, a national standard methodology for traffic operations analysis.

- ***State Street Safety Study Draft Traffic Operations Report.***

The report provided summaries of LOS for intersections along State Street / US 83 between Divide Avenue and Calgary Avenue.

- ***North Mandan Subarea Study.*** The report provided peak hour LOS for intersections in the North Mandan area, covering the urbanized portions of Mandan from I-94 to the north.

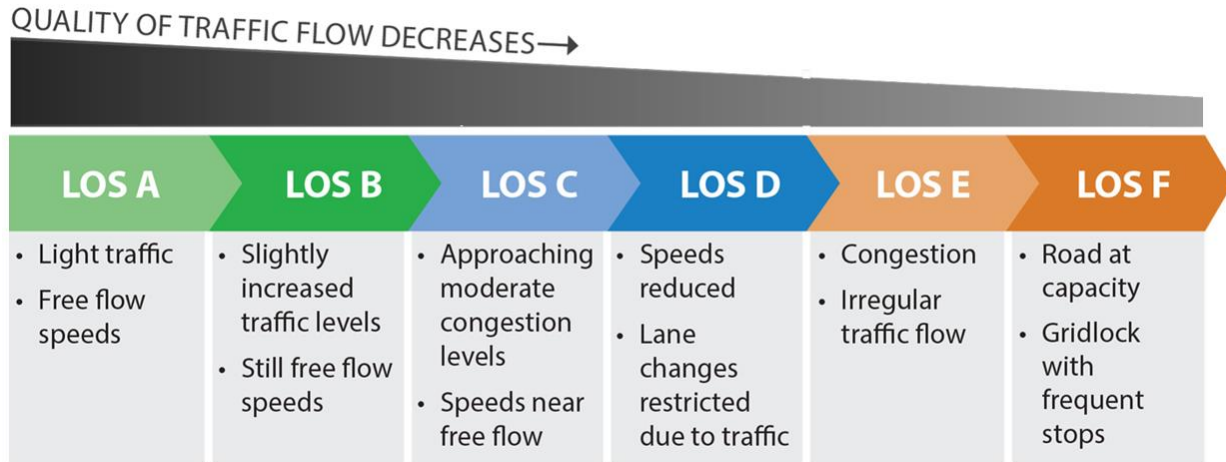


The traffic operations analysis completed for the remainder of the MPO study area used a combination of planning level techniques, including an Intersection Capacity Utilization (ICU) methodology at key intersections identified as important to north-south mobility in Bismarck (described later in this chapter), and a segment-based planning-level volume-to-capacity approach, based on the ARTPLAN methodology in the HCM.

Traffic analyses (both intersection and segment-level) were completed to put traffic operations in terms of a level of service (LOS). LOS is a qualitative measure describing a technical analysis of traffic operational conditions, and ranges from LOS “A” representing free-flow conditions to LOS “F” representing grid lock.

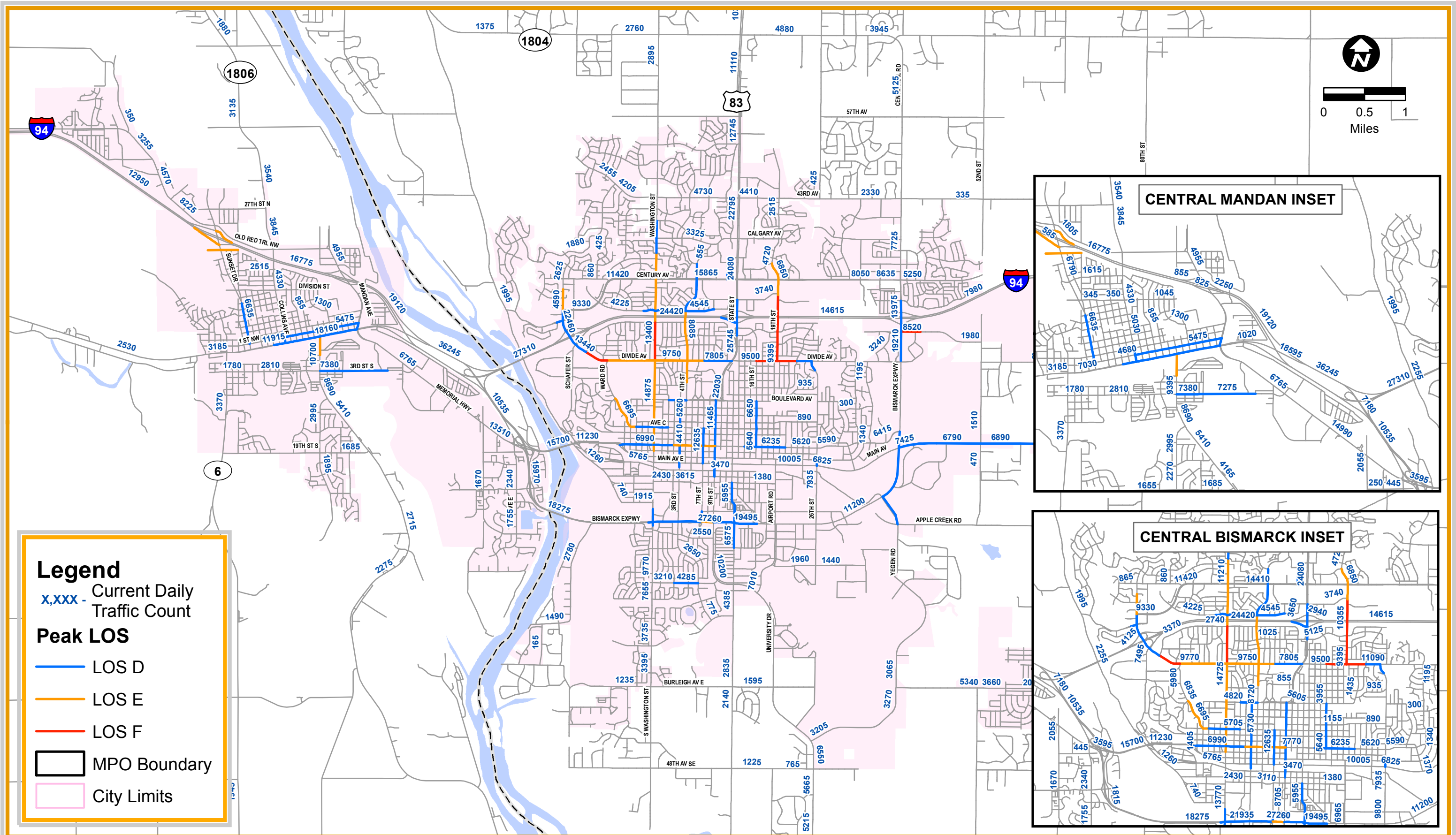
Figure 5-7 provides an illustration of the various levels of service.

Figure 5-7. Summary of Levels of Service



Source: *Highway Capacity Manual*, Transportation Research Board and HDR

Summarized LOS results for current peak conditions in the Bismarck-Mandan area are illustrated in **Figure 5-8**, including existing Average Daily Traffic (ADT) volumes. The levels of service shown in the current traffic operations figure are intended to reflect traffic operations during the highest congestion peak period conditions (for either the AM or PM peak). In the Bismarck-Mandan area, Level of Service “D” or worse has traditionally been considered undesirable or deficient. As shown in the figure, peak period conditions are at or above LOS D in several corridors across the metropolitan area. Those areas with LOS “D” or worse conditions were considered for improvements to future travel flow in the alternatives assessment in the 2040 LRTP.



Sources: Bismarck-Mandan MPO Count Shapefile, NDDOT Counts, HCM ARTPLAN, HDR, I-94 Corridor Study, North Mandan Study, State Street Safety Study, 43rd Ave Study, City of Bismarck and Mandan Staff Interviews

Current Conditions Daily Traffic Volumes and Peak Hour Level of Service

Figure: 5-8
Date: November 2014

5.2.3 SAFETY ASSESSMENT

The new performance management direction provided by MAP-21 includes a safety planning goal “to achieve a significant reduction in traffic fatalities and serious injuries on all public roads”. This section provides an assessment of current crash conditions in the study area. There were two levels of crash assessment completed:

- **Regional-level assessment:** This level of assessment provides a snapshot of current overall system crash levels. As the MPO moves forward, it will continue to monitor regional crash frequency on an ongoing basis to see how the system performs over time. Annual reporting of region-wide statistics on safety, along with each LRTP update every five years, will track regional progress towards safety objectives.
- **Intersection-level assessment:** This level of assessment identifies locations with the highest number of crashes. At the locations where the crash data identifies high crash-frequency intersections, the data is further reviewed to identify crash severity and crash types to see if patterns emerge.

Regional Crash Summary

The latest three years of NDDOT crash data for the MPO area and the two-county area⁸, 2010 through 2012, were reviewed and a summary of the number of crashes for the area are provided in **Table 5-2**.

Table 5-2. MPO Study Area and Two-County Crash Summary, 2010 to 2012

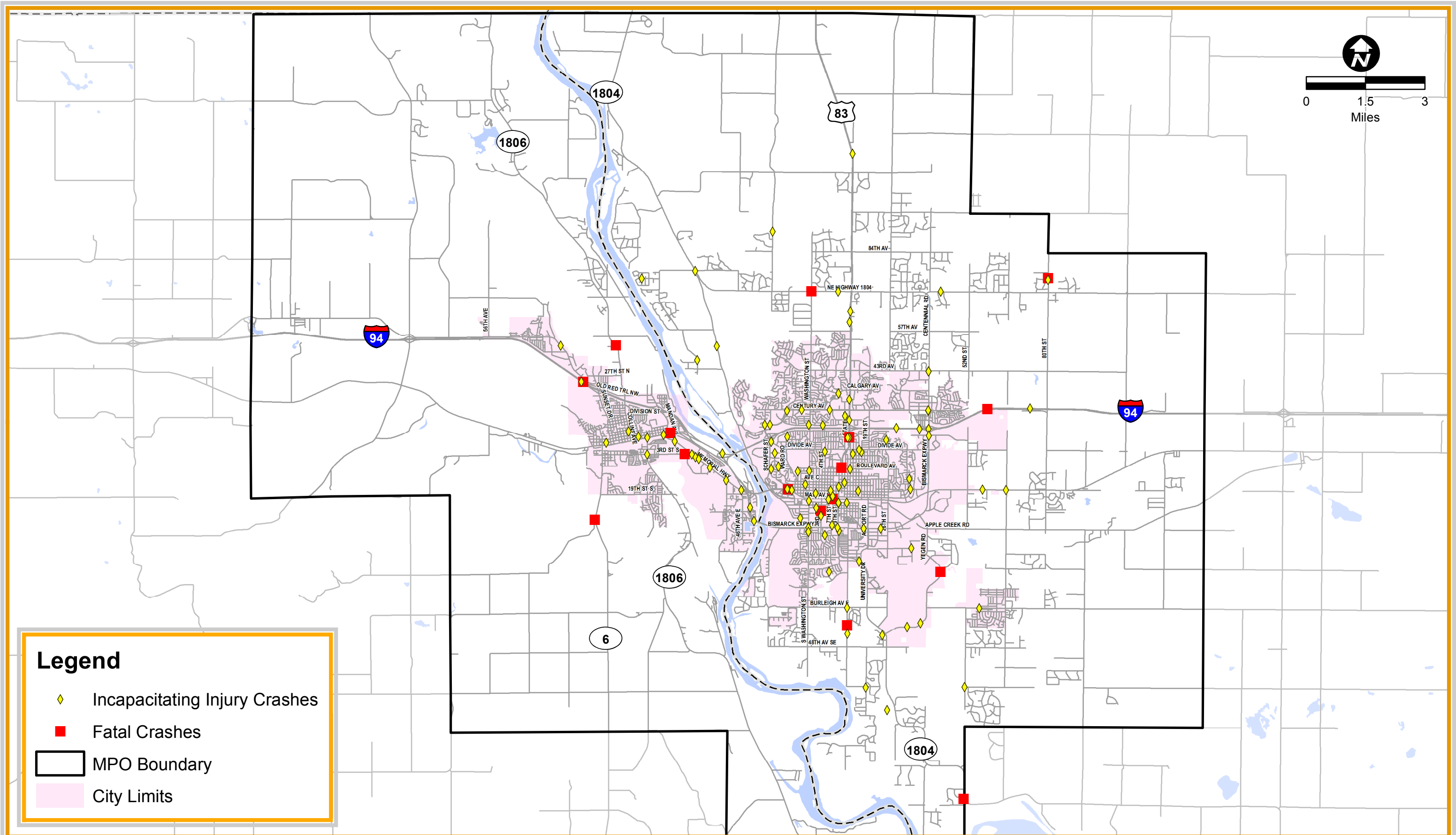
Crash Perspective	MPO Area Total	Burleigh and Morton Counties Total
Reported Crashes	8,293	8,866
Fatal Crashes	16	23
Incapacitating Injury Crashes	108	138
Bicycle-Involved Crashes	43	43
Pedestrian-Involved Crashes	67	68

Sources: NDDOT Crash Database, 2010-2012 and HDR

The locations of fatal crashes and incapacitating injury crashes within the MPO area are illustrated in **Figure 5-9**. As shown in the figure, the locations of fatality crashes are spread throughout the region and there are no locations of recurring fatal crashes in the 3-year assessment period. Of the 16 fatal crashes in the MPO study area:

- Two involved pedestrians
- Eight were single-car crashes
- Four were angle crashes
- One was a head-on collision
- One was a rear end collision

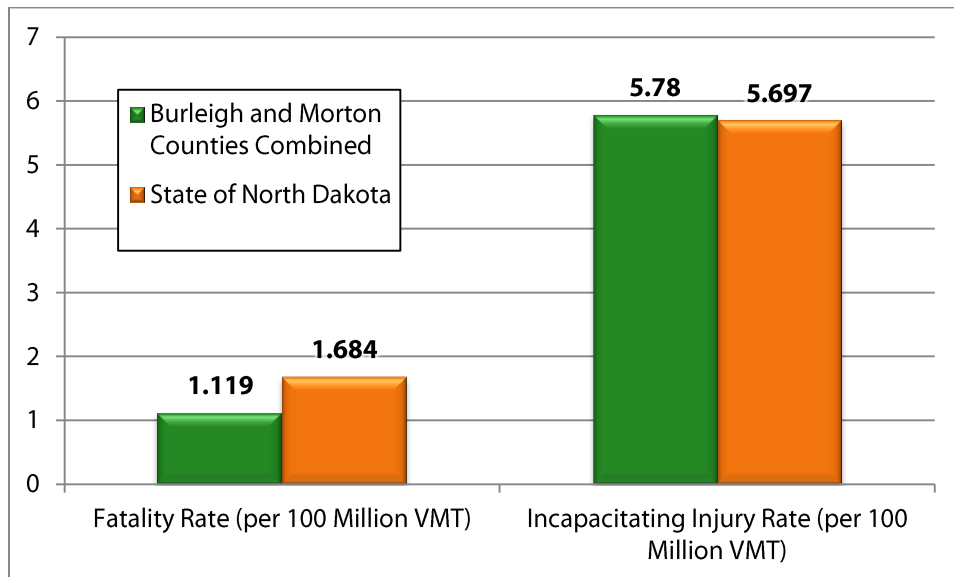
⁸ The MPO study area is geographically smaller than Burleigh and Morton Counties combined. However, VMT data are not provided by NDDOT at the MPO study area level, so two-county statistics are provided.



The performance measurement standards set out in MAP-21 state that safety objectives should be to reduce serious injury and fatal crashes. Thus, an overall regional performance measure based on crash rate is calculated for fatal and incapacitating crashes. The crash rate compares the number of these crashes compared to regional vehicle miles traveled (VMT). **Figure 5-10** provides a regional crash severity summary, based on 2012 VMT information provided by NDDOT.



Figure 5-10. Fatality and Incapacitating Injury Rate for Burleigh - Morton Counties and North Dakota



Source: Bismarck-Mandan MPO, 2012 Monitoring Report

As shown, the two-county area experienced a lower fatality rate compared to the statewide average rate, but higher incapacitating injury rate than the state as a whole during the study period.

Intersection Crash Assessment

Crash data were summarized and evaluated for all of the intersections in the MPO area, based on the three-year crash data provided⁹. **Figure 5-11** illustrates the frequency of recorded crashes in the Bismarck-Mandan MPO area for the years 2010 through 2012. The highest crash-frequency intersections in the Bismarck-Mandan MPO area are identified in **Table 5-3**. For the highest crash-frequency intersections, crash rates were calculated as the number of recorded crashes per million entering vehicles (MEV). As shown, the average crash rate for these highest-frequency crash intersections was 1.77 crashes per MEV.

⁹ For the purposes of this regional-level analysis crash records that were located within 250 feet of an intersection were considered "intersection related", based on guidance in the Highway Safety Manual.

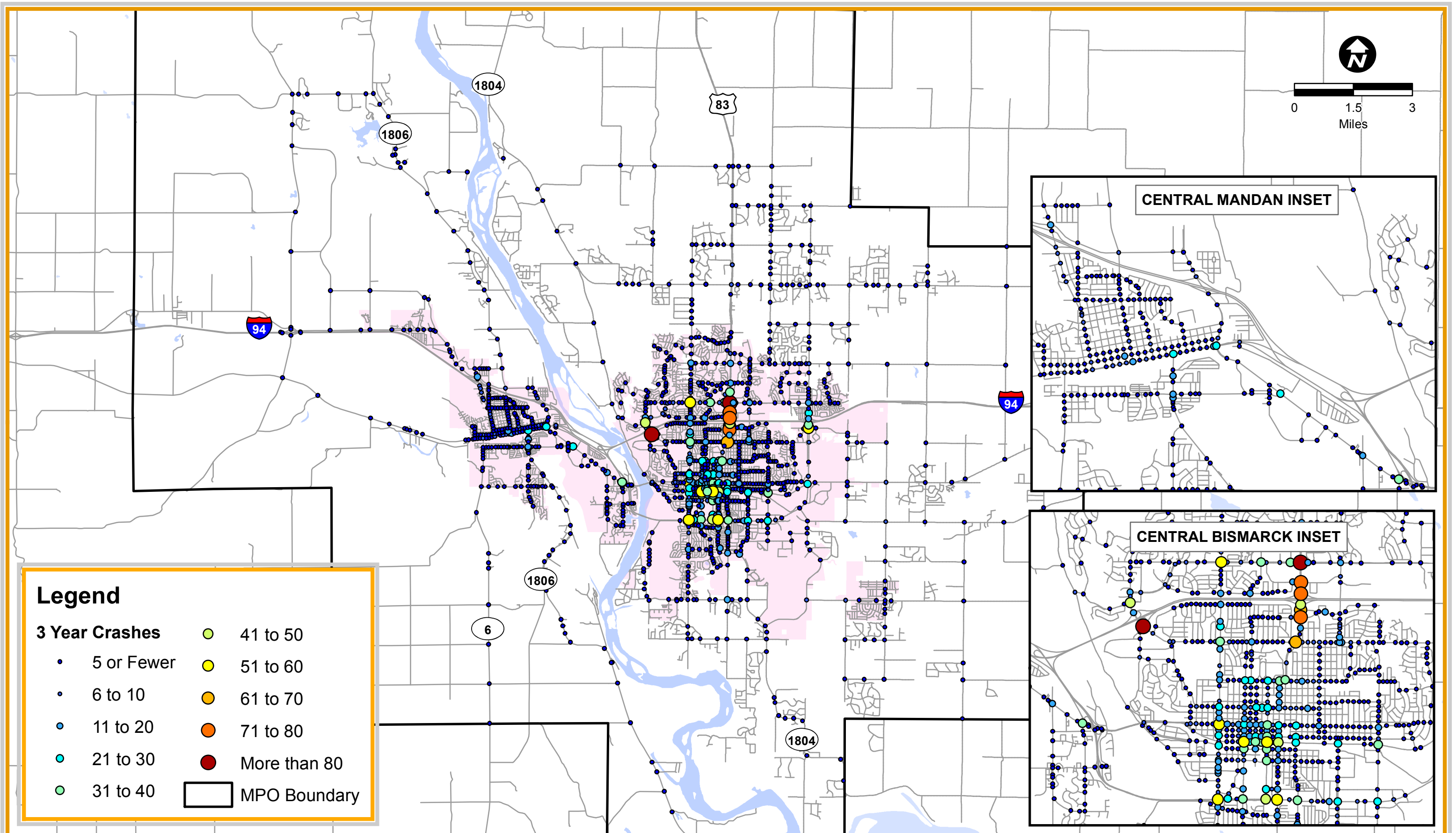


Table 5-3. Highest Crash-Frequency Intersections, Years 2010 through 2012

Intersection		Jurisdiction	3-Year Crashes	3-Year Million Entering Vehicles	Crash Rate (Crashes per MEV)
East - West Street	North - South Street				
Century Ave	State St	Bismarck	100	46.7	2.14
I-94 (EB On/Off Ramps)	Divide Ave(Exit 157)	Bismarck	87	29.1	2.99
Capitol Ave	State St	Bismarck	77	35.5	2.17
I-94 (WB On/Off Ramps)	State St (Exit 159)	Bismarck	77	46.1	1.67
Interstate Ave	State St	Bismarck	71	46.0	1.54
Divide Ave	State St	Bismarck	63	36.2	1.74
Interchange Ave	State St	Bismarck	62	35.1	1.77
Bismarck Expressway	Washington St	Bismarck	60	36.8	1.63
Bismarck Expressway	University Dr	Bismarck	59	38.2	1.54
Divide Ave	Bismarck Expressway	Bismarck	56	26.6	2.10
Main Ave	3rd St	Bismarck	53	20.3	2.60
Rosser Ave	Washington St	Bismarck	51	24.6	2.07
Main Ave	7th St	Bismarck	51	27.6	1.85
Century Ave	Washington St	Bismarck	51	26.9	1.90
Main Ave	9th St	Bismarck	50	26.7	1.87
I-94 (EB On/Off Ramps)	State St	Bismarck	49	37.1	1.32
Burnt Boat Dr	Tyler Pkwy	Bismarck	46	25.4	1.81
Bismarck Expressway	7th St	Bismarck	41	34.6	1.18
Front Ave	3rd St	Bismarck	40	17.8	2.25
Bismarck Expressway	3rd St	Bismarck	40	33.8	1.18
Memorial Highway	46th Ave SE	Mandan	37	17.7	2.09
Rosser Ave	7th St	Bismarck	36	25.5	1.41
Main Ave	6th St	Bismarck	35	14.8	2.36
Main Ave	5th St	Bismarck	35	16.0	2.19
Bismarck Expressway	12th St	Bismarck	35	29.6	1.18
Weiss Ave / Harvest Ln	State St	Bismarck	35	32.9	1.07
26-Intersection Total			1397	787.8	1.77

Sources: NDDOT Crash Database, 2010-2012 and HDR Engineering, NDDOT 2012 Traffic Volume Maps for Bismarck and Mandan.

The Bismarck-Mandan MPO's 2012 *Monitoring Report* cites similar analysis completed by the NDDOT, and is provided in [Appendix C](#).

Crash Type

Table 5-4 provides a summary of crash type for the highest crash-frequency intersections for the years 2010 through 2012. As shown in the table, the majority of crashes at the intersections (55%) were rear-end crashes. The three intersections with the highest proportion of rear-end crashes were¹⁰:

- **Divide Avenue & State Street:** 78% rear-end crashes
- **I-94 Eastbound On and Off Ramps & Divide Avenue:** 77% rear-end crashes
- **Rosser Avenue & Washington Street:** 75% rear-end crashes

The second highest crash type at the intersections (30%) was angle crashes. The three intersections with the highest proportion of angle crashes were:

- **Memorial Highway & 46th Avenue SE (in Mandan):** 59% angle crashes
- **Front Avenue & 3rd Street:** 55% angle crashes
- **Main Avenue & 3rd Street:** 47% angle crashes

The remaining crash types accounted for 10% or less of intersection crashes at the intersections. For these other crash types:

- The intersection with the highest percentage of sideswipe crashes was **Main Avenue and 7th Street**, with 11 sideswipe crashes from 2010 through 2012 (27% of intersection crashes).
- The intersection with the highest percentage of single-vehicle (non-collision with motor vehicle) crashes was **Washington Street & Bismarck Expressway** (10% of intersection crashes), with six (6) single-vehicle crashes over the three-year period.
- Five intersections in the top 25 for crash frequency had one (1) head-on crash during the 3-year analysis period. None of the top 25 intersections had more than one head-on crash.

¹⁰ Unless otherwise noted, intersections shown are in Bismarck.

Table 5-4. Crash Type at Highest Crash-Frequency Intersections, 2010-2012^a

Intersection		Rear End ^b	Angle ^c	Sideswipe ^d	Non-Collision with Motor Vehicle	Head On
East - West Street	North - South Street					
Century Ave	State St	54%	32%	9%	5%	0%
I-94 (EB On/Off Ramps)	Divide Ave (Exit 157)	77%	17%	2%	3%	0%
Capitol Ave	State St	48%	39%	9%	3%	1%
I-94 (WB On/Off Ramps)	State St (Exit 159)	68%	13%	16%	4%	0%
Interstate Ave	State St	52%	31%	11%	6%	0%
Divide Ave	State St	78%	13%	10%	0%	0%
Interchange Ave	State St	58%	32%	8%	2%	0%
Bismarck Expressway	Washington St	63%	18%	8%	10%	0%
Bismarck Expressway	University Dr	54%	31%	7%	7%	2%
Divide Ave	Bismarck Expressway	61%	34%	4%	2%	0%
Main Ave	3rd St	32%	47%	13%	8%	0%
Rosser Ave	Washington St	75%	20%	4%	2%	0%
Main Ave	7th St	39%	25%	27%	8%	0%
Century Ave	Washington St	65%	25%	2%	8%	0%
Main Ave	9th St	38%	46%	14%	2%	0%
I-94 (EB On/Off Ramps)	State St	45%	37%	14%	4%	0%
Burnt Boat Dr	Tyler Pkwy	57%	35%	7%	2%	0%
Bismarck Expressway	7th St	66%	12%	22%	0%	0%
Front Ave	3rd St	30%	55%	8%	8%	0%
Bismarck Expressway	3rd St	58%	28%	13%	0%	3%
Memorial Highway	46th Ave SE	41%	59%	0%	0%	0%
Rosser Ave	7th St	42%	42%	11%	6%	0%
Main Ave	6th St	57%	20%	20%	3%	0%
Main Ave	5th St	43%	26%	23%	9%	0%
Bismarck Expressway	12th St	51%	37%	6%	3%	3%
Weiss Ave / Harvest Ln	State St	57%	37%	3%	0%	3%
26-Intersection Total		56%	30%	10%	4%	>1%

Sources: NDDOT Crash Database, 2010-2012 and HDR Engineering

- Notes:
- a – Percentage totals may not add up to 100% due to rounding.
 - b – Includes “rear-to-side” crashes, which accounted for less than 1% of all crashes in this category.
 - c – Includes “Angle (Not Specific)”, “Angle (Opposite Direction)”, “Angle (Same Direction)”, and “Right Angle” in this category.
 - d – Includes “Sideswipe (opposite direction)” and “Sideswipe (same direction)” in this category.

Crash Severity by Intersection

Table 5-5 provides an overview of crash severity for the highest crash-frequency intersections for years 2010 through 2012, including a summary of the number of fatality, incapacitating injury, and non-incapacitating injury crashes by intersection. For each intersection, the table also provides the percentage of crashes that resulted in a fatality or injury (both incapacitating and non-incapacitating injuries). The three intersections with the highest proportion of combined fatality or injury crashes were:

- **Weiss Avenue / Harvest Lane & State Street** (14% of all crashes): One (1) incapacitating injury crash and four (4) non-incapacitating injury crashes.
- **Main Avenue & 7th Street** (12% of all crashes): One (1) fatal crash involving a pedestrian and five (5) non-incapacitating injury crashes.
- **Capitol Avenue & State Street** (12% of all crashes): One (1) fatal crash, one (1) incapacitating injury crash and seven (7) non-incapacitating injury crashes.

Table 5-5. Crash Severity at Highest Crash-Frequency Intersections, 2010-2012

Intersection		Fatal Crashes	Incapacitating Injury Crashes	Non-Incapacitating Injury Crashes	Crash Percentage Involving Fatality or Injury
East - West Street	North - South Street				
Century Ave	State St	0	0	7	7%
I-94 (EB On/Off Ramps)	Divide Ave(Exit 157)	0	1	3	5%
Capitol Ave	State St	1	1	7	12%
I-94 (WB On/Off Ramps)	State St (Exit 159)	0	0	4	5%
Interstate Ave	State St	0	1	2	4%
Divide Ave	State St	0	0	1	2%
Interchange Ave	State St	0	0	2	3%
Bismarck Expressway	Washington St	0	1	2	5%
Bismarck Expressway	University Dr	0	1	5	10%
Divide Ave	Bismarck Expressway	0	1	1	4%
Main Ave	3rd St	0	0	5	9%
Rosser Ave	Washington St	0	0	0	0%
Main Ave	7th St	1	0	5	12%
Century Ave	Washington St	0	0	5	10%
Main Ave	9th St	0	0	4	8%
I-94 (EB On/Off Ramps)	State St	0	0	0	0%
Burnt Boat Dr	Tyler Pkwy	0	0	2	4%
Bismarck Expressway	7th St	0	0	0	0%
Front Ave	3rd St	0	0	1	3%
Bismarck Expressway	3rd St	0	0	3	8%
Memorial Highway	46th Ave SE	0	1	0	3%
Rosser Ave	7th St	0	0	0	0%
Main Ave	6th St	0	0	0	0%
Main Ave	5th St	0	0	1	3%
Bismarck Expressway	12th St	0	0	3	9%
Weiss Ave / Harvest Ln	State St	0	1	4	14%
26-Intersection Total		2	8	67	6%

Sources: NDDOT Crash Database, 2010-2012 and HDR Engineering

Bicycle and Pedestrian Crashes

Figure 5-12 shows the location of bicycle and pedestrian crashes in the study area. To identify locations with multiple bicycle/pedestrian crashes, any roadway segments 250 feet or less in length were identified where two or more bicycle/pedestrian crashes occurred over the three-year analysis period. These roadway segments are reported in bullets below according to the nearest cross-street intersection. There were 12 locations where more than one bicycle and/or pedestrian crash happened during years 2010 through 2012, shown in Table 5-6.

Table 5-6. Locations with 2 or More Bicycle or Pedestrian Crashes, 2010 - 2012

Intersection	Jurisdiction	Bicycle-Involved Crashes	Pedestrian-Involved Crashes
South 12th Street between 8th Avenue and 10th Avenue	Bismarck	3	0
6th Avenue SE & 3rd Street SE	Mandan	1	1
Boulevard Avenue & 9th Street	Bismarck	0	2
Burleigh Avenue & 12th Street	Bismarck	1	1
Indiana Avenue & Washington Street	Bismarck	0	2
Main Avenue & 12th Street	Bismarck	1	2
Main Avenue & 3rd Street	Bismarck	2	1
Meadow Ln & 3rd Street SW	Mandan	2	0
Rosser Avenue & 3rd Street	Bismarck	1	2
Rosser Avenue & 6th Street	Bismarck	0	3
Rosser Avenue & 9th Street	Bismarck	1	1
Thayer Avenue & 7th Street	Bismarck	1	1

5.3 ASSET MANAGEMENT

Asset management, specifically National Highway System (NHS) infrastructure conditions, is a focus area of MAP-21. The targets for the MPO will be established in the near future, but this LRTP provides a baseline overview of current pavement and bridge conditions on the MPO study area system.

5.3.1 PAVEMENT CONDITION ASSESSMENT

The cities of Bismarck and Mandan completed a pavement management study in 2012 to examine the condition of roadway pavements. This initial survey and study effort provides the cities a baseline assessment of pavement conditions so future efforts could evaluate the effectiveness of ongoing pavement management activities. These ongoing studies will be important for future LRTP updates as it provides an understanding of ongoing needs for maintaining the current system.

The pavement management study used vehicles with specialized monitoring equipment to evaluate the roadways in Bismarck and Mandan, using the Pavement Condition Index (PCI), an industry standard methodology for evaluating pavement conditions. Based on PCI values a roadway is considered “Adequate”, “Degraded”, or “Unsatisfactory”. **Figure 5-13** shows the results of the 2012 baseline survey.

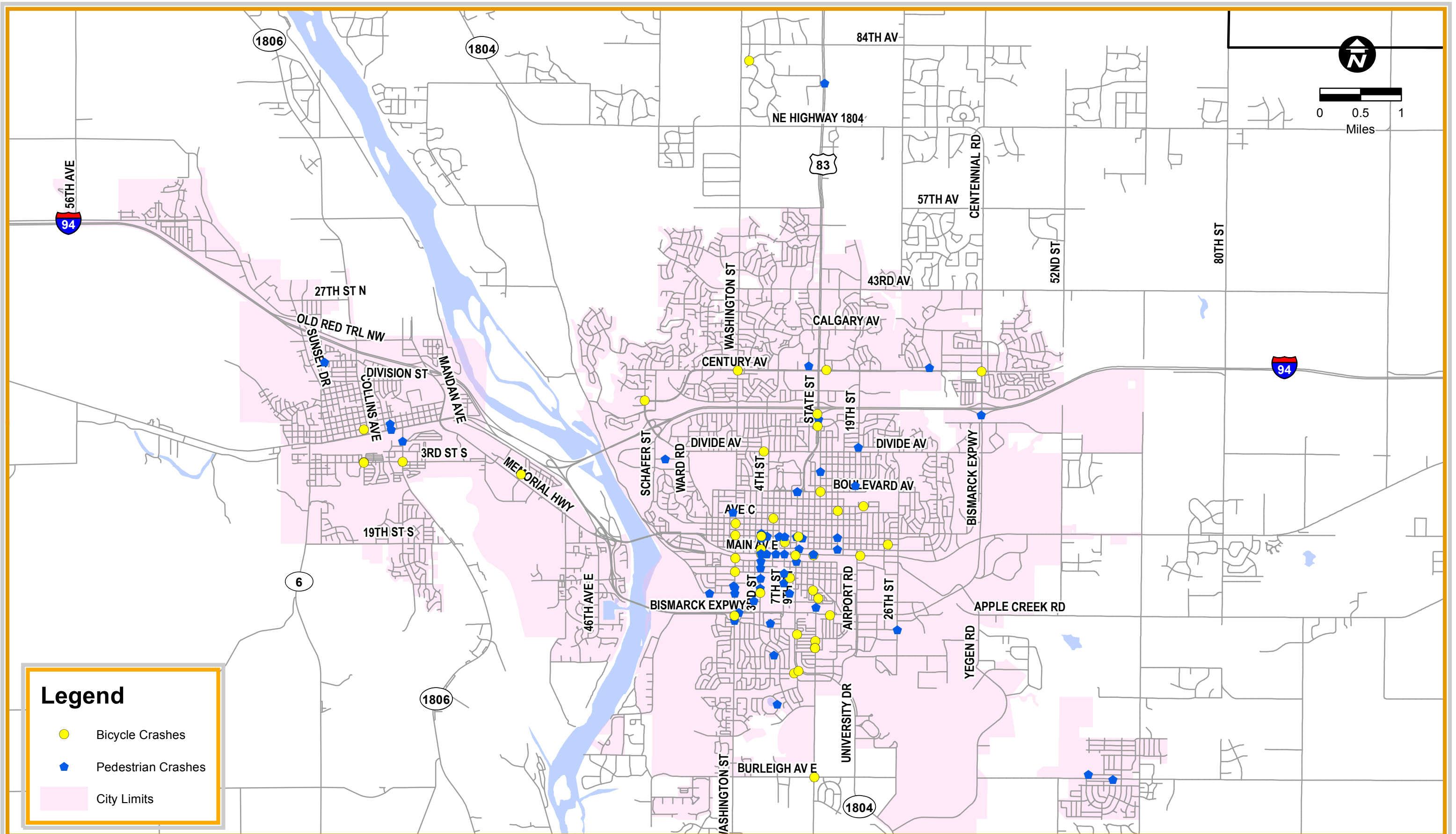
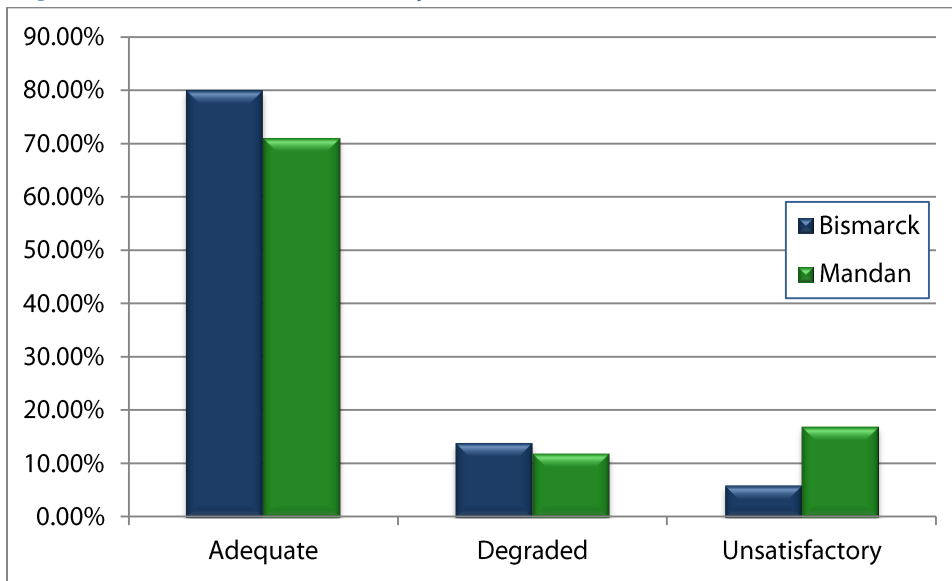


Figure 5-13. Current Roadway Pavement Condition for Bismarck and Mandan

Source: State of the Streets Report, Bismarck and Mandan reports, 2012

As shown, the majority of pavements in both cities were considered “Adequate”. A larger percentage of Mandan pavements were considered “Unsatisfactory” in comparison to Bismarck. This information provides an appropriate framework for understanding current and future maintenance needs in the Bismarck-Mandan area.

5.3.2 BRIDGE STRUCTURE ASSESSMENT

An assessment of bridge structures in the MPO area is based on the FHWA -managed National Bridge Inventory (NBI). Under the NBI, bridges are evaluated on multiple factors. A composite of these measurements, known as a Sufficiency Rating, ranges between 0 (for entirely deficient structures) and 100 percent (for entirely sufficient structures). A low Sufficiency Rating may be due to structural defects, narrow lanes, low vertical clearance, or any of many possible issues.

A Structural Evaluation is one component that describes the overall rating of the bridge structure’s condition. Poor status is categorized under two themes:

- **Functionally Obsolete:** A functionally obsolete classification means that the structure does not meet current design standards. Due to physical limitations (e.g.: lane width, clearance), the structure cannot adequately meet traffic demands and frequently impedes traffic. This status does not imply a safety issue, only functional deficiency.
- **Structurally Deficient:** indicates the presence of structural defects. A bridge is classified as structurally deficient if one or more of a bridge’s main components has been rated in poor condition (0-4 on the NBI Rating Scale), the load carrying capacity has been surpassed, or water frequently overflows the deck and impedes traffic. Though structures with this classification typically need repair, it is not intended to comment on the severity of the bridges deficiency or classify the bridge as unsafe.

The NDDOT is the agency responsible for evaluating the sufficiency of bridges throughout the State of North Dakota. There are 119 bridges within the MPO boundary and 13 have an insufficient rating. According to 2012 inspection reports, of the 119 bridges identified, six (5%) of these bridges are identified as functionally obsolete and three (2.5%) are structurally deficient¹¹.

The functionally obsolete bridges are located at:

- Two I-94 bridges over Sunset Drive in Mandan
- I-94 at Bismarck Expressway in Mandan
- Main Avenue over Washington Street in Bismarck
- 15th St NW in Burleigh County, approximately ¾ mile south of 110th Ave North
- 35th St just east of 29th Ave in Morton County

The structurally deficient bridges are located at:

- 80th Street bridge over I-94 (in current TIP to be replaced) in Burleigh County
- Along 33 ½ St west of Highway 25 in Morton County
- On I-94 near the rest area on the eastern edge of the MPO boundary

5.4 REGIONAL TRANSIT SYSTEM

Public transit service in the Bismarck-Mandan MPO area is provided by the Bis-Man Transit Board. The board provides two types of public transit: fixed route bus service through Capital Area Transit (CAT) and paratransit / demand response service through Bis-Man Transit. The City of Bismarck has contracted these services through the Board since the service was first offered in the metropolitan area in 1990. The CAT fixed route service started in May 2004.

The *Bismarck-Mandan Regional Travel Survey* asked respondents whether they or anyone in their household had used the Bismarck-Mandan transit system:

- 9% of regional respondents answered that they or someone in their household had used the transit system.
- 91% of regional respondents answered that no one in their household had used the transit system.

5.4.1 BIS-MAN TRANSIT (PARATRANSIT)

Bis-Man Transit started door-to-door paratransit service in 1990. The paratransit system provides service for persons with disabilities and to senior citizens. Paratransit services are provided in compliance with the Americans with Disabilities Act (ADA). From its beginning, the paratransit service has offered access 24



¹¹ NDDOT Structure Inventory and Appraisal Sheet for Bridge Inventory, April 3, 2012.

hours a day, seven days a week and has been managed by the Bis-Man Transit Board. The service provides approximately 170,000 annual passenger trips. Services operate throughout the greater Bismarck-Mandan area, as well as to Lincoln and the University of Mary, and provide access for persons with disabilities and anyone age 60 or older. Paratransit service farebox revenues increased by 2% between 2005 and 2012. Operating expenses increased 58% in this same time period.

5.4.2 CAPITAL AREA TRANSIT

The CAT (Capital Area Transit) is the fixed route bus system serving Bismarck and Mandan. Since beginning service 10 years ago, Capital Area Transit has expanded to 12 routes serving Bismarck and Mandan: 10 routes operate in Bismarck and two routes serve Mandan with connections to Bismarck. Most of the routes in the system operate every hour during the peak periods and every two hours during the midday period. The exceptions are Routes E1 and E2 which operate every 30 minutes during peak periods and hourly during the midday period, and Routes M1 and M2 which operate every two hours throughout the day.

Routes E1 and E2 in Bismarck and Routes M1 and M2 in Mandan are the highest ridership and productivity routes in the system.

The Bismarck-Mandan transit system transports less than 1% of commute trips in the region.

According to the 2008-2012 American Community Survey, the average travel time to work via public transit in Bismarck-Mandan was 33.8 minutes. *Mobility 2017*, the current Transit Development Plan for the MPO, places an emphasis on improving the productivity of the CAT fixed route system. A productive transit service is one that provides service, or rides, for the least amount of route mileage and cost as possible. To track how the transit services have performed over time, **Table 5-7** provides an overview of how various operating statistics have changed for both the fixed-route bus and demand response systems between 2005 (the first full year of CAT service) and 2012 (the last full year of transit data available). Farebox revenues increased by 99% between 2005 and 2012. Operating expenses also increased 84% in this same time period.



Table 5-7. Change in Bismarck-Mandan Fixed Route Bus and Demand Response Operating Statistics, 2005 to 2012

Operations Element	2005		2012		2005 to 2012 Change	
	Fixed Route Bus	Demand Response	Fixed Route Bus	Demand Response	Fixed Route Bus	Demand Response
Operating Expenses	\$756,454	\$1,189,169	\$1,389,282	\$1,879,491	84%	58%
Fare Revenues	\$40,640	\$373,242	\$80,849	\$379,869	99%	2%
Annual Vehicle Revenue Miles	279,561	734,010	302,977	623,172	8%	-15%
Annual Vehicle Revenue Hours	20,686	54,842	19,787	44,507	-4%	-19%
Annual Unlinked Trips	90,692	190,518	141,067	168,121	56%	-12%
Operating Expense per Passenger Mile	\$2.46	\$1.65	\$2.06	\$2.96	-16%	79%
Operating Expense per Vehicle Revenue Hour	\$36.57	\$21.68	\$70.21	\$42.23	92%	95%
Operating Expense per Unlinked Passenger Trip	\$8.34	\$6.24	\$9.85	\$11.18	18%	79%

Source: Federal Transit Administration, *National Transit Database*, 2005 and 2012.

Figure 5-14 shows existing fixed-route transit routes in the study area. The performance characteristics for each transit service are shown in **Table 5-8**.

Table 5-8. 2012 Transit Operating Characteristics

	Bus (CAT)	Demand Response (Bis-Man Transit)
Operating Expenses	\$1,389,282	\$1,879,491
Fare Revenues	\$80,849	\$379,869
Annual Vehicle Revenue Miles	302,977	623,172
Annual Vehicle Revenue Hours	19,787	44,507
Annual Unlinked Trips	141,067	168,121
Operating Expense per Passenger Mile	\$2.06	\$2.96
Operating Expense per Vehicle Revenue Hour	\$70.21	\$42.23
Operating Expense per Unlinked Passenger Trip	\$9.85	\$11.18

Source: Federal Transit Administration, *National Transit Database*, 2012.

Figure 5-15 illustrates the annual transit system ridership in the form of annual unlinked trips, based on data from the National Transit Database. This figure shows the introduction of fixed route bus service (CAT) in 2004. A spike in transit ridership in 2008 is consistent with national transit trends during a time where gas prices increased and vehicle trips declined. Since that time the total annual transit trips in the Bis-Man area has remained approximately 300,000 trips.

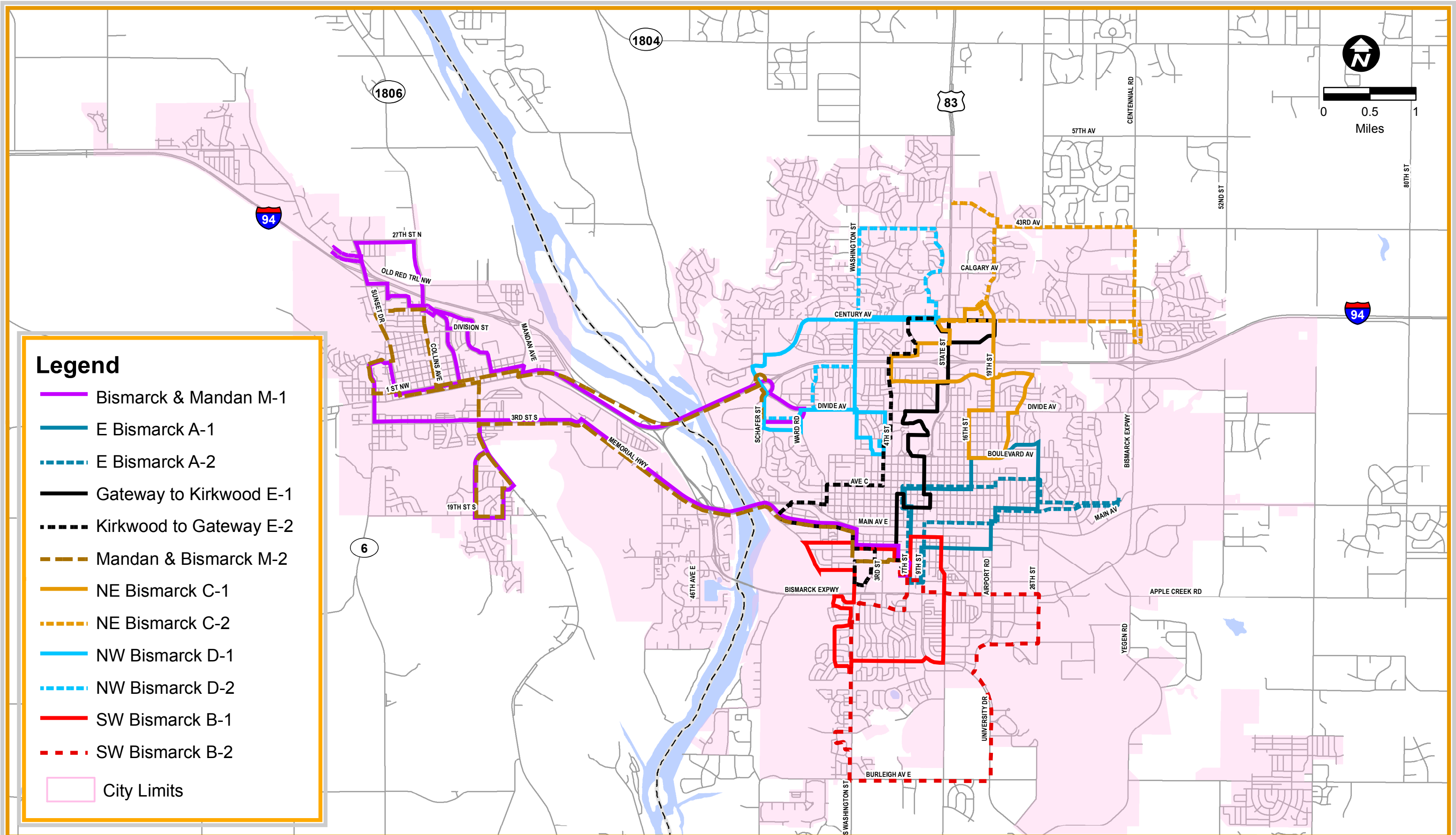
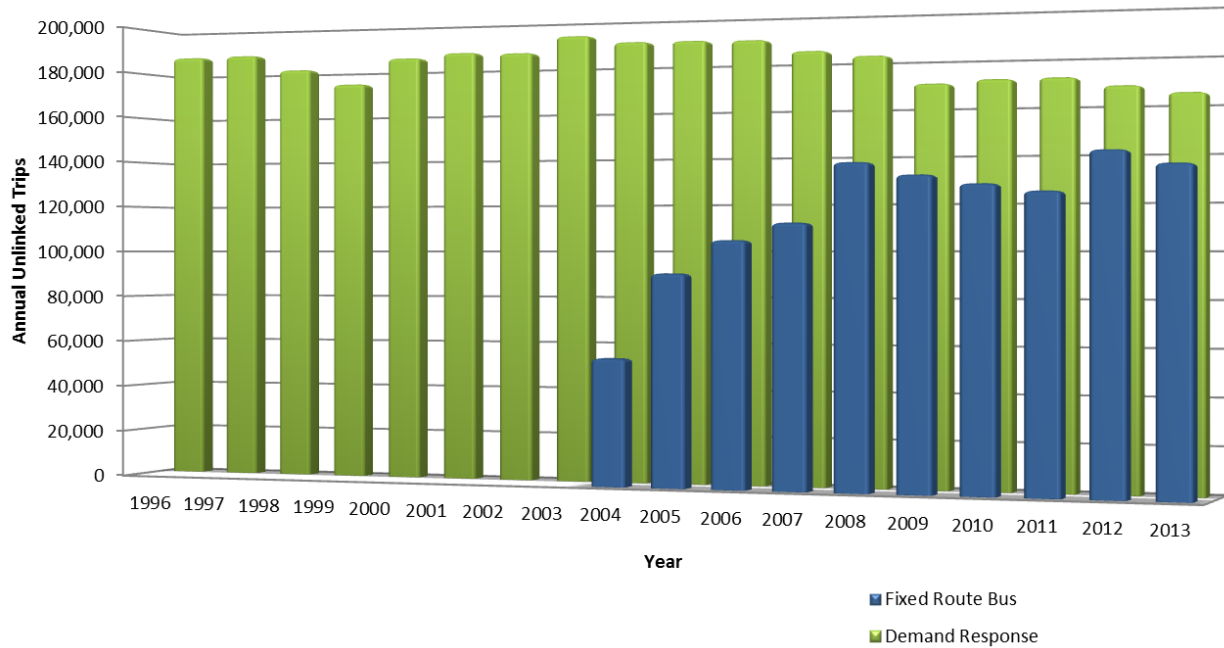


Figure 5-15. Annual Ridership on Bismarck-Mandan Transit Services



Sources: National Transit Database, 2012 and Bis-Man Transit Board.

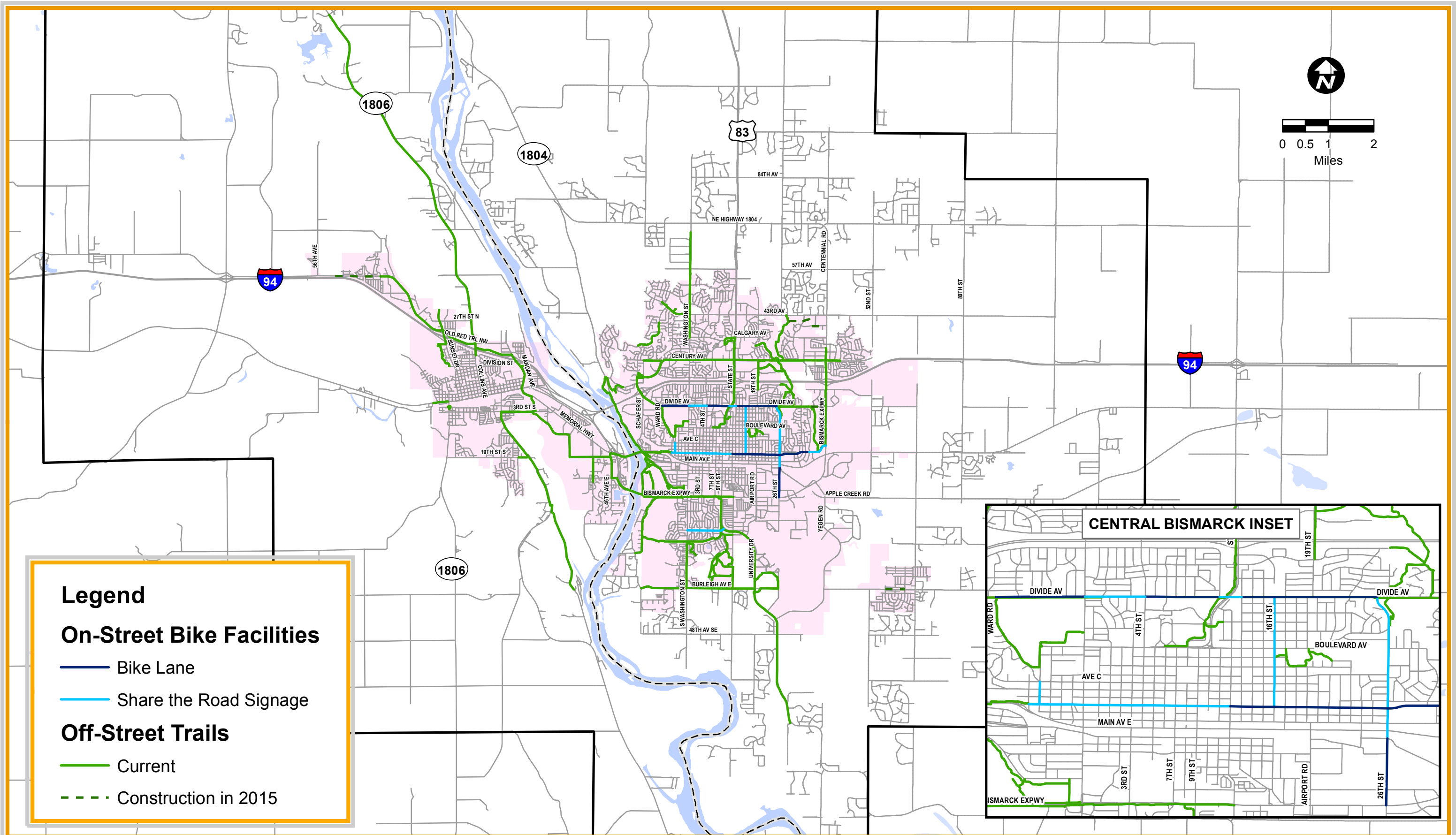
5.4.3 PEER CITY COMPARISON

A review of transit services in peer cities was provided in the *Mobility 2017* report. This evaluation incorporated comparable cities in the region, including Billings, Fargo-Moorhead, Grand Forks, Rapid City, and Sioux Falls. The comparison generally found that:

- When compared to peer cities, the CAT service has a significantly higher operating cost per passenger, and the Bis-Man Paratransit service has a significantly lower operating cost per passenger.
- When compared to peer cities, the Bismarck-Mandan area spends a much lower portion of total expenses on fixed route service compared with Paratransit service. *Mobility 2017* noted that this allocation is generally inconsistent with its peers.

5.5 BICYCLE AND PEDESTRIAN SYSTEM

A comprehensive review and assessment of the Bicycle and Pedestrian system was completed as a part of the 2040 LRTP. The current trail and on-street bicycle system is illustrated in **Figure 5-16**.



The *Bismarck-Mandan Regional Travel Survey* asked respondents whether they or anyone in their household had ridden a bike in the last year:

- 48% of respondents answered that no one in their household had ridden a bike in the last year.
- 52% of respondents answered that they or someone in their household had ridden a bike in the last year. Of those that had ridden their bike:
 - 79% did it for recreation.
 - 18% had done it for recreation and commuting trips.
 - 3% had done it for commuting trips.

Several data sources were reviewed to gain an understanding of the bicycle and pedestrian system, including geographic information systems (GIS) data of existing trails, bike lanes, “share the road signage”, on-street traffic volumes, aerial photography, and existing sidewalk coverage (where available).

A group of bicycle and pedestrian planners working on the LRTP rode bicycles and walked as much of the trail, sidewalk, and street network as possible during site visits in September 2013. During the visit, system assets and system challenges were noted.

System Assets Noted:



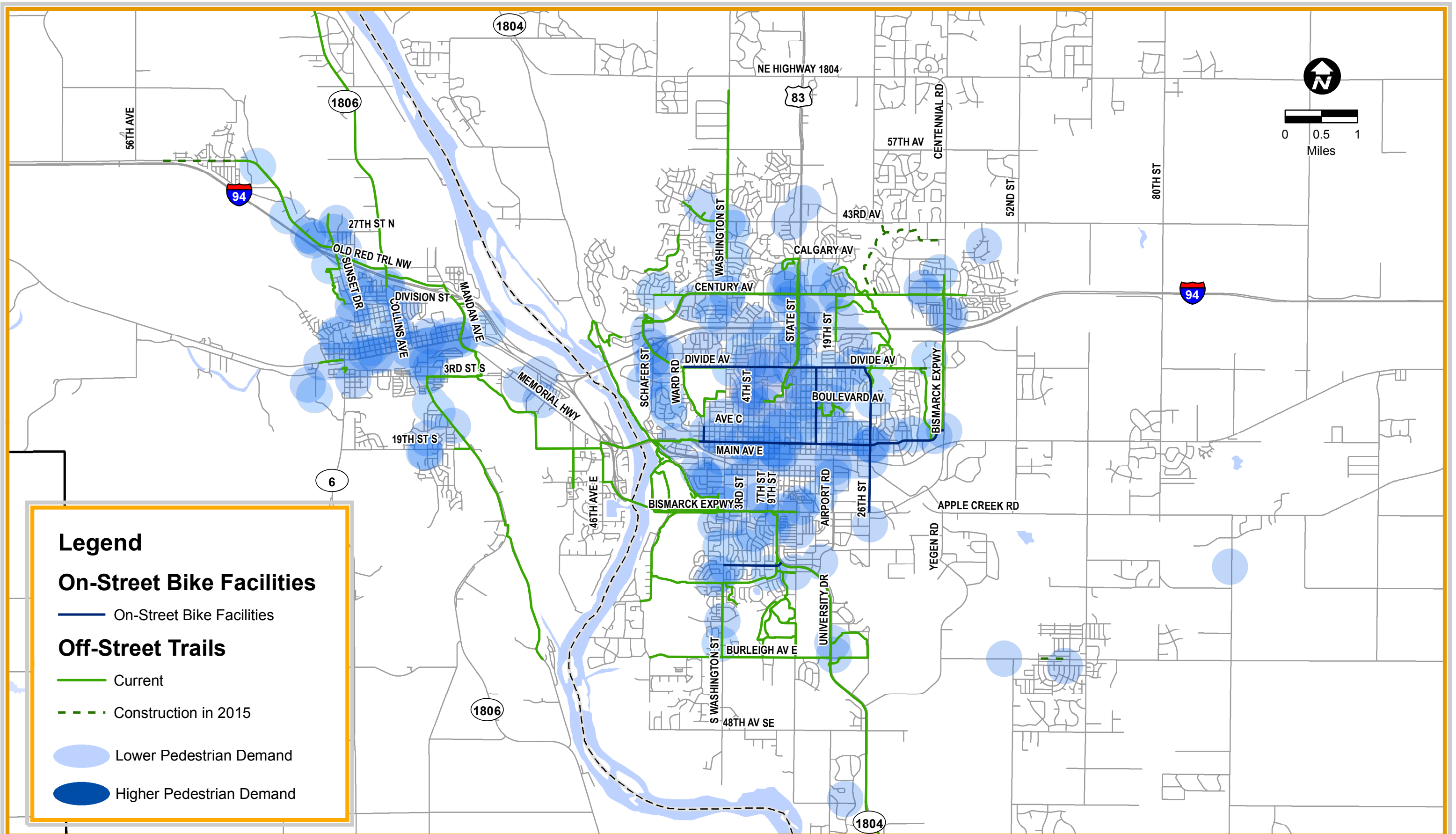
System Challenges Noted:

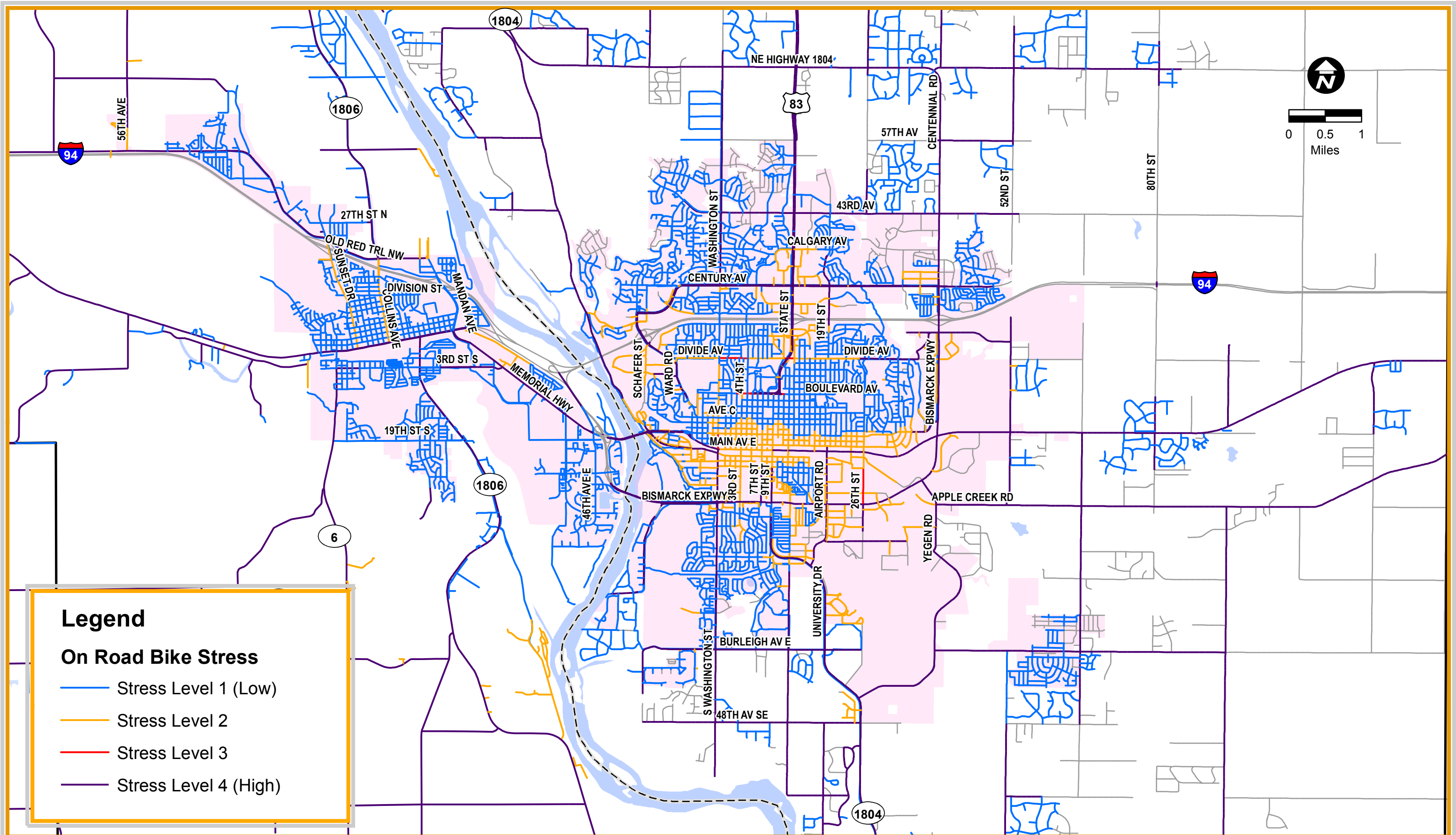


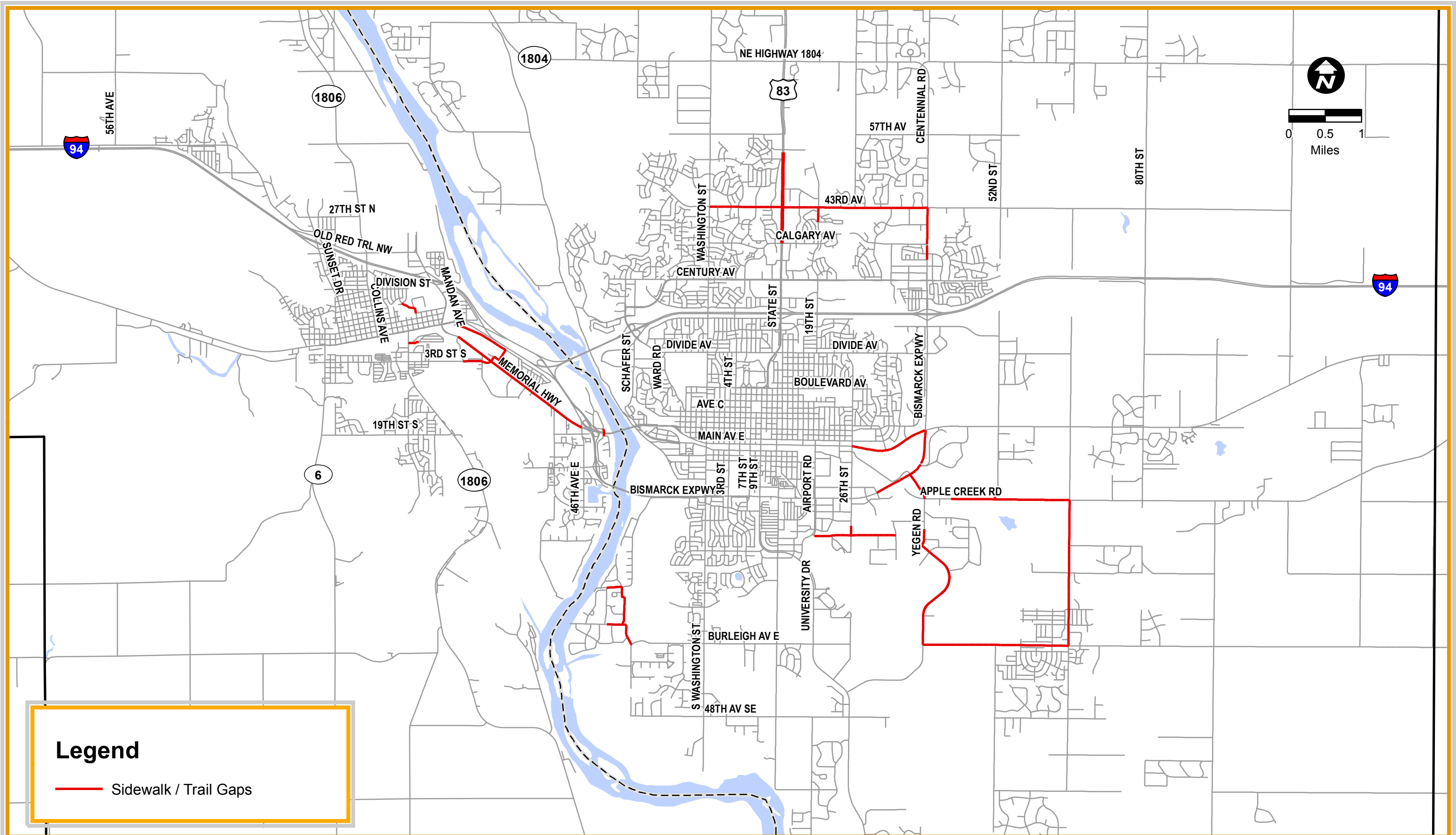
Two other elements of the existing conditions bicycle and pedestrian assessment looked at the demand and supply side of bicycle trips:

- **Demand Assessment:** To gain an understanding of the demand for bicycle and pedestrian connections, a simplified demand assessment was constructed. Relative levels of bicycle and pedestrian demand within different parts of the Bismarck-Mandan area were estimated based on applying a GIS analysis of proximity to various key destinations. **Figure 5-17** shows the demand assessment. The key destinations considered for the demand map included:
 - Schools
 - Parks
 - Large retail destinations
 - Grocery and convenience stores
 - Downtown
 - State Capitol
 - Churches
 - Bus stops
- **On-Street Suitability:** A “Level of Stress” assessment was completed for on-street bicycling suitability. The level of stress looked at several factors, including posted speed limit, number of vehicle travel lanes, and land use criteria. Levels of stress range from “1 – Low Stress”, suitable for most bicyclists, to “4 – High Stress” with multiple travel lanes, only suitable for advanced bicyclists. The level of stress assessment is shown in **Figure 5-18**.

A final assessment of the bicycle and pedestrian system evaluated pedestrian connectivity in the urban portions of the study area. This assessment reviewed available GIS and aerial mapping data, looking for gaps in the sidewalk and trail system between urban-scale developments in the MPO area. While overall, the Bismarck-Mandan area has a comprehensive sidewalk and trail system, several gaps were identified. **Figure 5-19** shows the identified pedestrian system gaps. Note that many of the system gaps occur along portions of the urban area roadway system that have rural roadway cross-sections (roadways with ditches but no curb and gutter).







5.6 FREIGHT SYSTEMS

Freight connections provide a valuable economic connection for the regional economy. Bismarck-Mandan is a key freight location in the state and upper Midwest, with several links in the state and national system. Key freight roadway links include:

- **Interstate 94**
- **US Highway 83**
- **State Highway 6**
- **State Highway 1806**
- **State Highway 25**
- **State Highway 810**
- **State Highway 1804**

Key rail links include:

- The **Burlington Northern Santa Fe (BNSF) Railroad's mainline** goes through Bismarck and Mandan and just north of Lincoln. Three BNSF subdivisions come together in Mandan.
- The **Dakota, Missouri Valley & Western (DMVW) railroad's "X Line" branch**, on a line leased from the Canadian Pacific Railroad. This branch offers a connection between Bismarck and the Canadian Pacific Railroad at Max, ND.

Additional freight links include:

- A **transloading facility at the Northern Plains Commerce Center**, allowing businesses in the development to switch freight between rail and truck.
- The **Bismarck Municipal Airport** provides an air freight services link to the region.

The regional economy and business community rely on these direct freight linkages to the wider economy to maintain and enhance the strong metropolitan economy. Thus, the efficient movement of freight within and across the Bismarck-Mandan region is important to several sectors of the metropolitan, state, and national economy. In terms of freight, the LRTP is focusing on:

- Ways to identify public needs on the freight system and provide potential improvements that can be made to maintain quality freight service.
- Reduction of conflicts between the freight system and the wider community, specifically:
 - Minimize the level of heavy truck traffic outside of industrial areas.
 - Assess conflicts at rail grade crossings between roadway vehicular flow and trains.

5.6.1 TRUCK FREIGHT

To manage the flow of freight through the community, the jurisdictions have attempted to provide direct connections between industrial areas (where truck trips are generated) and the wider regional freight system. Current truck routes are shown in **Figure 5-20**.^{12 13}

Note that Burleigh County has load restrictions on all county and township roads of 10 tons per axle with an 80,000 lb. maximum load restriction. However, two key corridors (shown in **Figure 5-6**) in the MPO area have load restrictions that are increased to 105,500 lbs. maximum load:

- **Highway 10** east of Bismarck
- **71st Street / Centennial Road** between US 83 and Century Avenue.

As shown in the truck route figure, there are some gaps in the truck route system, but the majority of industrial areas are directly connected to the wider regional truck network.



5.6.2 RAIL FREIGHT

The 2040 LRTP includes an assessment of not only train operations through Bismarck-Mandan, but also reviews at-grade crossings. At-grade crossings are locations where train-vehicle interactions can conflict and create safety concerns and intermittent travel delays.

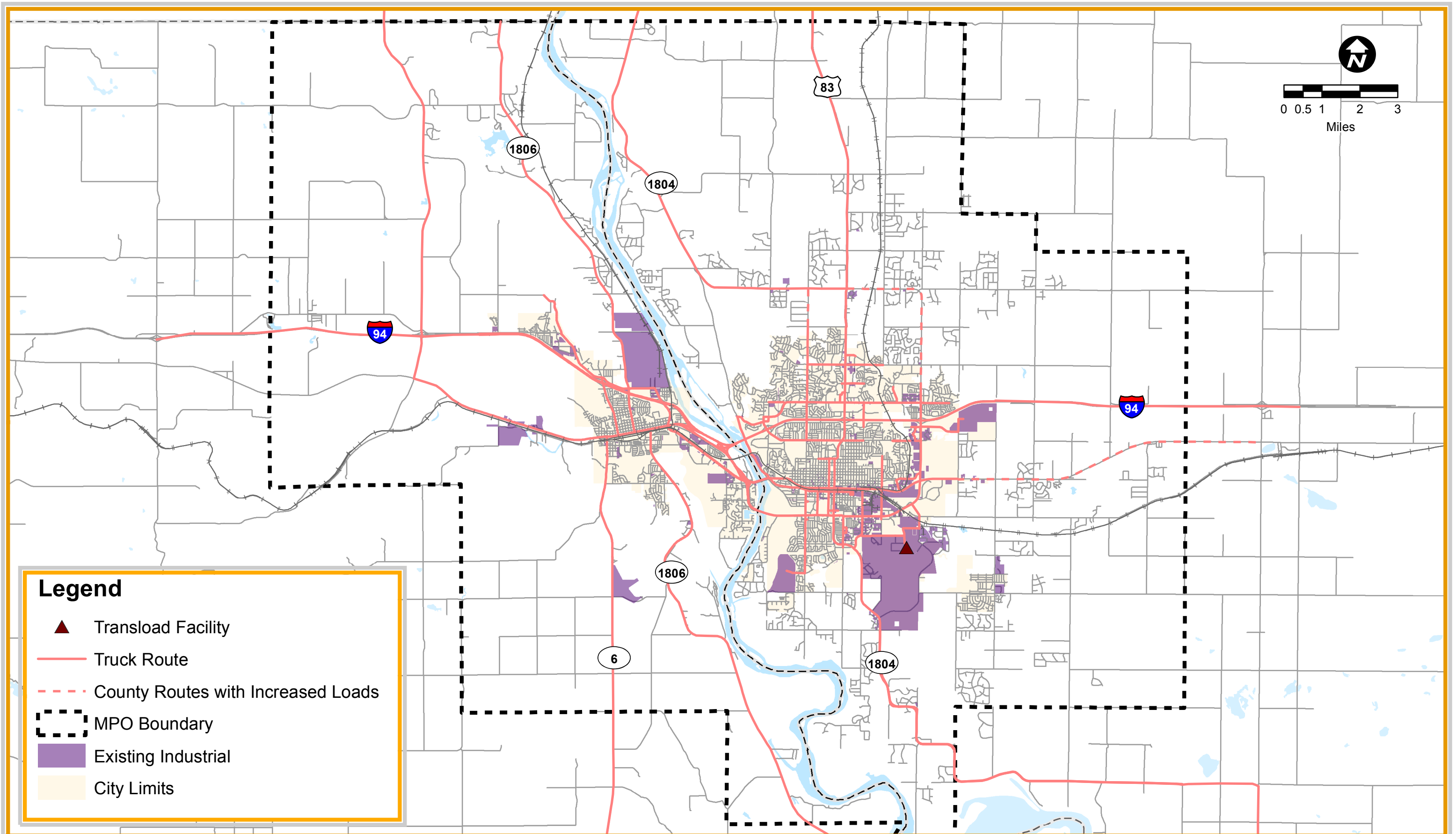
There were two (2) vehicle-train crashes reported at at-grade intersections in the 2010-2012 crash dataset. The train-vehicle crashes were reported as:

- A property-damage only crash at the Railroad Avenue crossing of the DMVW railroad, which is the access to the entrance of the North Dakota State Penitentiary.
- A property-damage only crash at the 26th Street crossing of the BNSF railroad.

Table 5-9 provides a summary of the at-grade BNSF mainline railroad crossings through the MPO area, including type of crossing control and daily vehicular traffic (ADT) on the crossing road. **Figure 5-21** illustrates each of the at-grade and grade separated crossings in the MPO study area. **Table 5-10** provides a similar summary for the DMVW railroad crossings. Currently Bismarck is actively pursuing implementation of a **quiet zone** through the downtown area, making improvements to key at-grade rail crossings so trains will not be required to sound their horns as they travel through downtown.

¹² Note that the routes within the City of Mandan are not officially designated, but reflect the latest information provided by City staff.

¹³ The designated truck routes are also consistent with the Federal "National Network" in 23 CFR Part 658.



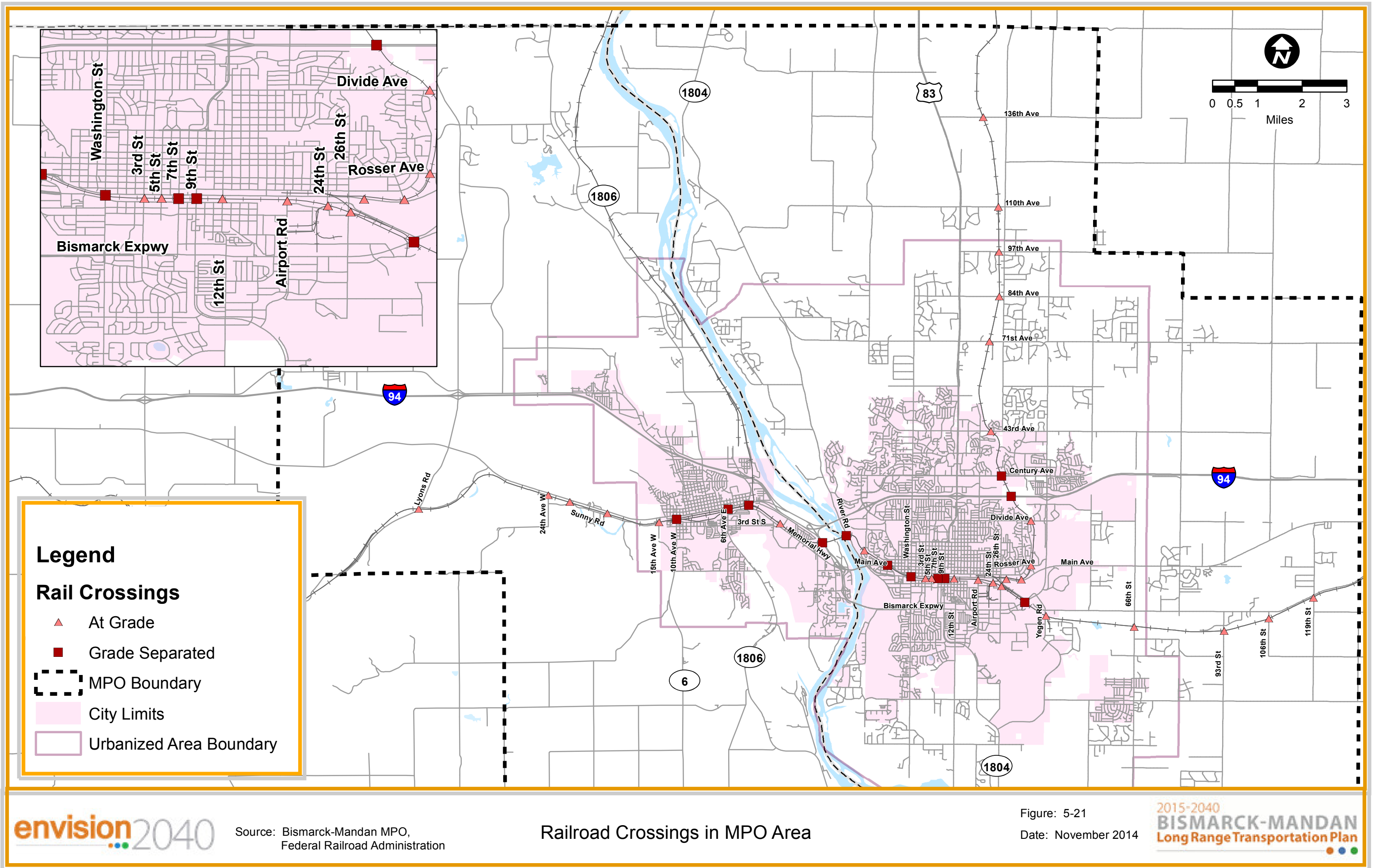


Table 5-9. Roadway Crossing Summary for BNSF Rail Line

Railroad / Crossing Street	Number of Tracks	Mainline / Other	Trains Per Day ¹	Crossing Protection		Train Speed (MPH)	Daily Vehicular Traffic at Crossing ²	Count Year
BNSF								
119th Street	1	Mainline	30	Gates Signs	Flashers Bells	<60	no data	
106th Street	1	Mainline	30	Gates Signs	Flashers	<60	110	2003
93rd Street	1	Mainline	30	Gates Signs	Flashers Bells	<60	460	1995
66th Street	1	Mainline	30	Gates Signs	Flashers Bells	<60	3115	2012
Yegan Road	1	Mainline	30	Gates Signs	Flashers Bells	<60	5520	2012
26th Street	2	Mainline & Transfer	30	Gates Signs	Flashers Bells	<35	7935	2012
24th Street	4	Mainline & Other	30	Gates	Flashers Bells	<35	1850	2006
19th Street	2	Mainline & Siding	30	Gates Signs	Flashers Bells	<35	7610	2012
12th Street	3	Mainline & Yard	30	Gates Signs	Flashers Bells	<35	6765	2012
5th Street	1	Mainline	30	Gates	Flashers Bells	<35	3530	2012
3rd Street (Bismarck)	1	Mainline	30	Gates	Flashers Bells	<35	11090	2012
Fraine Barracks	1	Mainline	30	Private Crossing		<35	300	2009
3rd Street (Mandan)	1	Mainline	30	Gates Signs	Flashers Bells	<35	985	2009
15th Avenue SW	1	Mainline	30	Gates Signs	Flashers Bells	<20	265	2009
Sunny to 94B Connector	1	Mainline	30	Gates Signs	Flashers Bells	<20	no data	
Sunny to 94B Connector (Gravel)	2	Mainline & Siding	30	Gates Signs	Flashers Bells	<50	no data	
24th Avenue West	1	Mainline	30	Gates Signs	Flashers Bells	<50	no data	
Lyons Road	1	Mainline	30	Gates	Flashers Bells	<50	no data	

Source: US DOT, Federal Railroad Administration, *Rail Crossing Inventory*.

Notes: 1 Trains per day based on latest information provided by Bismarck City Staff.

2 Based on latest ADT traffic count data available from NDDOT

Table 5-10. Roadway Crossing Summary for DMVW Rail Line

Railroad / Crossing Street	Number of Tracks	Mainline / Other	Trains Per Day	Crossing Protection		Train Speed (MPH)	Daily Vehicular Traffic at Crossing ¹	Count Year
DMVW								
Railroad Avenue (State Penitentiary)	1	Other	1	Signs		<10	600	2006
Railroad Avenue (State Penitentiary)	1	Other	1	Signs		<10	600	2006
24 th Street	1	Mainline	1	Signs		<20	825	2006
Main Avenue (26th)	1	Mainline	3	Signs		<10	9705	2012
Eastdale Drive	1	Mainline	2	Gates	Flashers	<40	1370	2012
Rosser Avenue	1	Mainline	1	Gates	Flashers	<20	3450	2001
Divide Avenue	1	Mainline	1	Gates	Flashers	<35	3715	2012
43rd Avenue	1	Mainline	1	Gates	Flashers	<40	3825	2012
71st Avenue	1	Mainline	1	Gates	Flashers	<35	4880	2012
84th Avenue	1	Mainline	1	Signs		<35	1988 data	
97th Avenue	1	Mainline	1	Gates	Flashers	<35	1988 data	
110th Avenue	1	Mainline	1	Signs		<35	1988 data	
136th Avenue	1	Mainline	1			<35	1988 data	

Source: US DOT, Federal Railroad Administration, *Rail Crossing Inventory*.

Notes: 1 Based on latest ADT traffic count data available from NDDOT

5.7 AIR TRANSPORTATION

Bismarck and Mandan each have a Municipal Airport located within the MPO study area. Travel to and from the airport facilities impact the Bismarck-Mandan surface transportation system. This section highlights the trends in air traffic in the Bismarck-Mandan area to understand how they might affect the multimodal network adjacent to the airports.

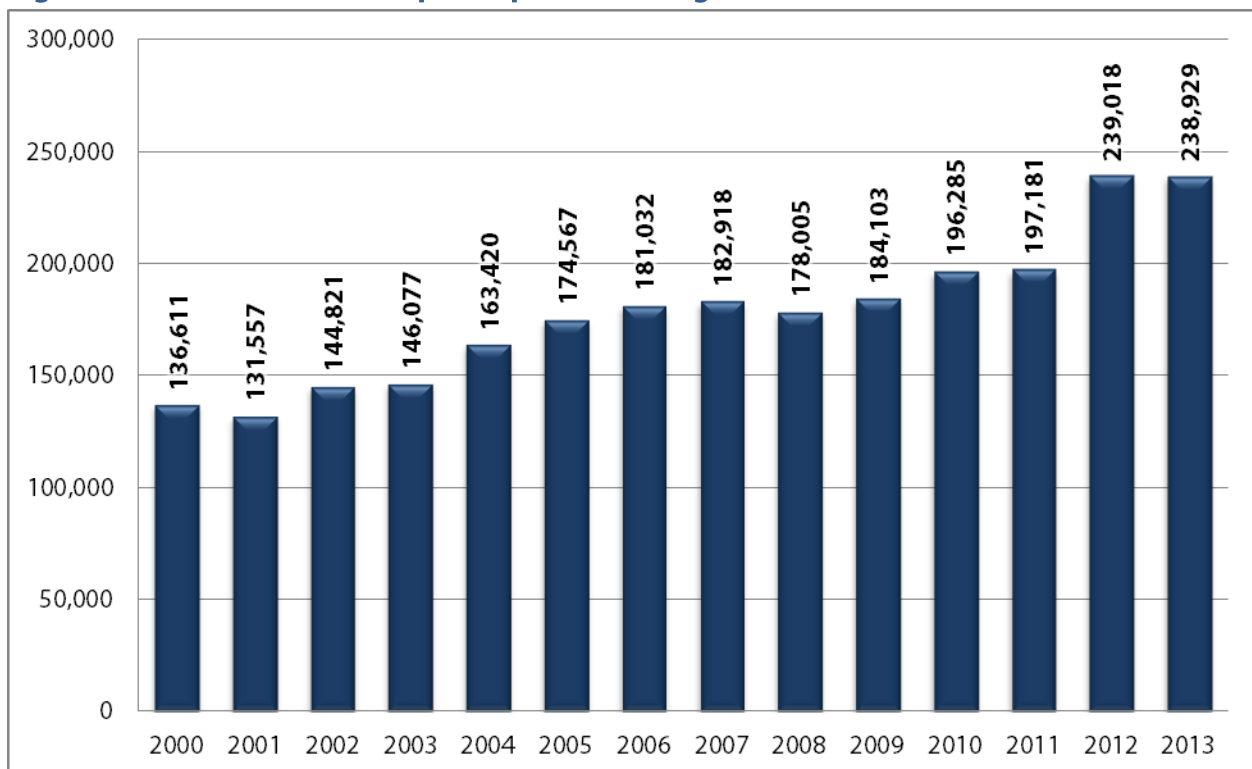
The Mandan Municipal Airport is located 4 miles south of Main Street on Highway 6. This general aviation airport houses 32 planes that average 22 operations per day. Operations include local general aviation, transient general aviation, military, and air taxi.

The Bismarck Municipal Airport is located south of the East Bismarck Expressway on ND 1804/University Drive. Improvements to ND 1804/University Drive in 2007 provided improved capacity and access to the airport. As of October 2014, commercial air passengers are provided service by five airlines:

- **Allegiant Airlines** with direct flights to Las Vegas, NV, Phoenix / Mesa, AZ and Orlando, FL.
- **American Airlines** provides direct flights to Dallas, TX and Chicago, IL.
- **Delta Airlines** provides service to Minneapolis, MN.
- **Frontier Airlines** provides direct flights to Denver, CO.
- **United Airlines** with direct flights to Denver, CO.

The Bismarck Municipal Airport had its highest-ever level of passenger boardings in June 2012. The increase in passenger boardings coincided with the addition of Frontier Airlines in May 2012. This increase is reflected in 21 % increase total passenger boardings from 2011 to 2012. During the same period of time, national passenger boardings percentage dropped 1 percent. Boardings remained relatively constant for 2013, near their peak levels of 2012. Historical airport boardings at the Bismarck Municipal Airport are shown in **Figure 5-22**.

Figure 5-22. Bismarck Municipal Airport Boardings



Source: Federal Aviation Administration, *Passenger Boarding and All-Cargo Data, CY Commercial Service Enplanements*

5.8 NORTH-SOUTH MOBILITY IN BISMARCK

As presented in the various sections of this chapter, there are several current multimodal challenges facing the region. One of the major challenges noted in the analysis and noted via the public input received during the LRTP update has been north-south mobility through Bismarck. As identified in the functional classification map provided previously in **Figure 5-4**, the main arterials that support north-south mobility through significant portions of the City of Bismarck are:

- **Washington Street corridor:** This is the only continuous arterial street in Bismarck from the north city limits to the south city limits. The corridor varies from 2-lane roadway to a 4-lane roadway with continuous center turn lane throughout the corridor.
- **State Street (US 83) / 7th Street / 9th Street / University Drive corridor:** This arterial corridor provides a combination of streets that offers north-south mobility from North Bismarck to South Bismarck. This corridor provides at least two –through lanes of capacity in each direction on all segments, including on the one-way segments of 7th Street and 9th Street. State Street has an interchange with I-94.
- **Centennial Road / Bismarck Expressway corridor:** this arterial corridor provides a north-south arterial connection on the east side of Bismarck. North of the Airport, Bismarck Expressway is an east-west street, so this corridor is not continuous to the south city limits. South of Jericho Road, this corridor is a 4-lane divided facility with interchange access to I-94. Between Jericho Road and 43rd Avenue, it was recently widened to 3-lanes. North of Jericho Road, Centennial Road is currently a 2-lane roadway with turn lanes in some locations.

There are additional links in the arterial and collector system that provide shorter arterial segments in Bismarck, but none as continuous as the three noted above. Several elements contribute to the issue with north-south mobility in Bismarck, including:

- Peak period traffic congestion in key arterial corridors
- Heavy commercial vehicles mixing with local commuter traffic
- Gaps in the north-south roadway network
- Gaps in the north-south bicycle network

The remainder of this section provides a summary of each of the elements that affect existing north-south mobility in Bismarck.

Peak period traffic congestion

As noted previously in **Figure 5-8**, all three of the primary north-south Bismarck arterial corridors have some level of peak period congestion that cause travel delays during the peak hours.

- Washington Street has significant levels of delay, with LOS E or F peak hour conditions from north of Century Avenue to south of Rosser Avenue, approximately 2.25 miles of the corridor including 8 traffic signals. This can add up to 8 to 10 minutes of additional travel time through the congested portions of the corridor on a typical peak hour compared to off-peak conditions.

- The State Street / 7th Street / 9th Street corridors have 1 to 1.5 miles of the corridor with LOS D through the corridor, including from Capitol Avenue to Interstate Ave, and portions of 7th Street and 9th Street north of downtown. This can add up to 3 to 5 minutes of additional travel time through the congested portions of the corridor on a typical peak hour compared to off-peak conditions.
- The Centennial Road / Bismarck expressway corridor has segments adjacent to the I-94 interchange and near Main Avenue that experience LOS D conditions during the peak hour. This can add up to 2 minutes of additional travel time through the congested portion of the corridor on a typical peak hour compared to off-peak conditions.

Heavy Commercial Truck Traffic

Heavy commercial trucks moving freight in, out and through the region utilize the north-south arterial roadways in Bismarck. All three corridors are designated truck routes, facilitating freight movement which plays a critical roll in the local and state economy. Washington Street and the Centennial Road / Bismarck Expressway corridors are a combination of City- and County-designated truck routes. State Street (US 83) is part of the “National Network” on the National Highway System, a Federal designation that ensures heavy trucks have access to these key links that connect principal cities. At the same time, truck freight in these corridors conflicts with local vehicular traffic making their daily commute trips, affecting north-south mobility. During the public involvement and data collection efforts of the 2040 LRTP, the issue of trucks impacting north-south travel through Bismarck was particularly noted along State Street and Centennial Road. Along State Street heavy trucks often have slow acceleration time when starting from a stop at red lights at traffic signals, which affects efficient progression for all vehicles through the coordinated signals in the corridor. Trucks turning onto / from the I-94 interchange ramps at State Street and Centennial Rd / Bismarck Expressway were identified by the public as occasional sources of travel delays at those locations.

The latest traffic count information available from NDDOT indicates the following heavy truck counts along some of the arterial segments north of I-94:

- On Washington Street north of Century Avenue, the 2014 daily heavy truck count was 220, or just under 2% of all daily traffic.¹⁴
- On State Street just north of Century Avenue, the 2014 daily heavy truck count was 1,220, or 4% of daily traffic.¹⁴
- On Centennial Road just south of Century Avenue, the 2014 daily heavy truck count was 1,015, or 6% of daily traffic.¹⁴

Gaps in the Roadway Network

There are several locations in Bismarck’s north-south corridor grid where there are significant gaps in the roadway network, particularly across I-94 and in central Bismarck. These gaps / connectivity issues focus traffic flows onto a smaller set of through roadways, affecting north-south mobility:

- There are no continuous north-south arterial connections west of Washington Street.

¹⁴ NDDOT *Interactive Transportation Information Map*, http://gis.dot.nd.gov/external/ge_html/?viewer=transinfo “Miovision portable counts” from 2014 used.

- River Road (1-2 miles west of Washington Street) is classified as a collector, and has limited ability to provide significant regional mobility due to topography issues that limit connections to the road. Topography and the road's proximity to the bluffs also is also a limiting factor on the ability to maintain and improve roadway along some segments.
- Tyler Parkway has a relatively short segment classified as a principal arterial adjacent to I-94, but does not continue south of Divide Avenue due to development and topographical constraints. North of Century Avenue, Tyler Parkway is classified as a minor arterial, but provides significant levels of direct driveway access to residential development, limiting mobility for through travel due to functional conflicts.
- There is a 1.5 mile roadway gap in north-south I-94 crossings between 19th Street, a collector street, and Centennial Road / Bismarck Expressway. It is 2 miles between State Street and Centennial Road / Bismarck Expressway, the two most adjacent arterials in this part of Bismarck.
- On the developing eastern edge of Bismarck, there is a 3 mile gap in north-south I-94 crossings between Centennial Road / Bismarck Expressway and 80th Street, a rural gravel roadway.
- There are other corridors with higher levels of traffic (5,000 to 10,000 average daily traffic or more) that provide some level of north-south mobility, but are discontinued in various locations:
 - 19th Street, a collector, is not continuous south of Divide Ave.
 - 26th Street, a minor arterial, is not continuous north of Divide Ave.
 - 4th Street, a minor arterial, is not continuous north of Calgary.

These gaps in the north-south network increase out of direction travel and can increase delays during peak conditions in other north-south corridors.

Gaps in the Bicycle and Pedestrian Network

There are several locations in the bicycle and pedestrian network in Bismarck with significant gaps in the connectivity. As shown previously in **Figure 5-16**, some of the gaps in the bicycle network include:

- **Connectivity in northeast Bismarck:** North of Calgary Avenue, there are no designated north-south bicycle facilities (on-street or off-street trails) east of Washington Street.
- **Connectivity across I-94:** Across I-94 there are no designated north-south bicycle facilities between Tyler Parkway and State Street.
- **Connectivity in Central Bismarck:** In central Bismarck, there are no designated north-south bicycle facilities between Griffin Street (4 blocks west of Washington Street) and 16th Street.
- **Connectivity in South Bismarck:** South of Rosser Street, there are no designated north-south bicycle facilities between the Riverfront Trail / Sertoma Park Loop and 26th Street.

The gaps in the pedestrian system were documented previously in **Figure 5-19**.

Chapter 6 FUTURE SYSTEM PERFORMANCE

The *2015-2040 Bismarck-Mandan Long Range Transportation Plan* uses a year 2040 planning horizon to provide a 25 year time period after plan adoption for prioritizing regional transportation improvements. This chapter provides a performance assessment of the future transportation system, with the information available. Much of the information leverages the future land use scenario documented in *Chapter 4*, and utilizes the set of tools available in the Bismarck-Mandan Travel Demand Model.

6.1 TRAVEL MODEL BACKGROUND

The MPO's travel demand model is a computer application maintained for the MPO study area that evaluates regional travel, and helps the community make informed decisions on transportation investments. The model employs a simplified planning model approach, utilizing the three following travel model steps:

- **Trip generation:** this phase estimates how many trips occur in part of the MPO study area.
- **Trip distribution:** this phase estimates where trips come from and go to.
- **Trip assignment:** This phase determines the route on the roadway network that each auto trip will use.

The Bismarck-Mandan model does not use the **mode split** step (traditionally the third of the four steps in traditional four-step planning model) as all modeled trips are auto trips. The travel model estimates travel for an average weekday. Trips are generated using household and employment data at the traffic analysis zone (TAZ) level. Travel forecasts are generated within the model based on the assumed land use inputs (that represent residents' activity locations) and transportation network included in the travel model. The model can be used to evaluate traffic forecasts by changing the two main model input sets:

- Assessing **land use / development changes**; specifically, the traffic levels and patterns associated with new residential developments or new employment locations.
- Assessing **transportation system changes**, evaluating new roadway corridors or adding lanes to an existing street. In the alternatives assessment portion of the LRTP, this allowed the LRTP team to test the potential roadway improvements for traffic operations effects and performance.

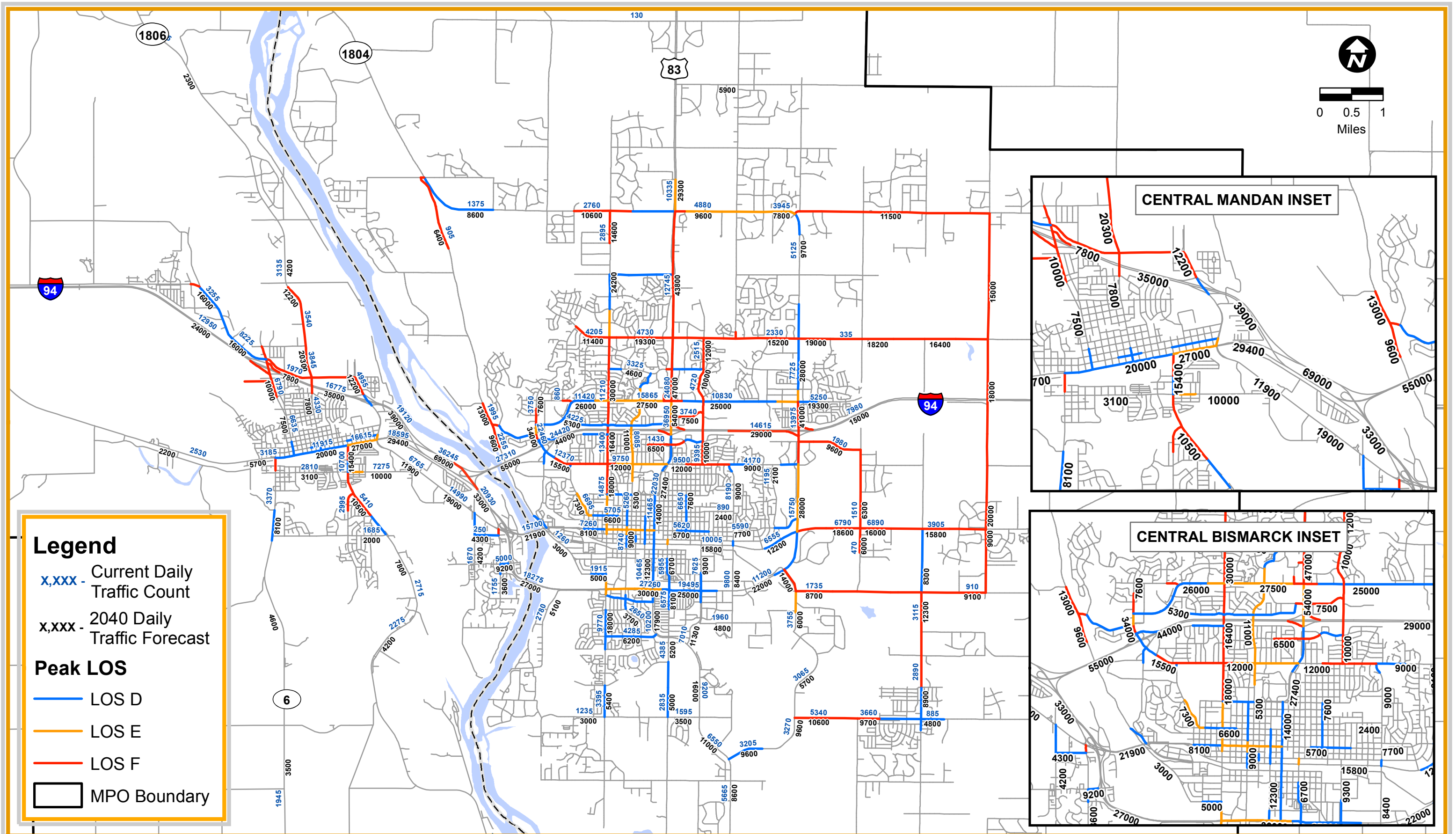
The travel model was developed to reflect year 2010 conditions, as established by the Advanced Traffic Analysis Center at North Dakota State University. The year 2010 was selected as the baseline for the model, as a complete set of Census Data was available for that year, and NDDOT traffic counts were available to validate the model. Validation is the process of adjusting the input model assumptions and parameters so that the model is reasonably replicating base year traffic characteristics and patterns. Once validated, land use and transportation system scenario assessments described above can be evaluated.

6.2 FUTURE TRAFFIC VOLUMES AND OPERATIONS

Traffic forecasts were prepared for a 2025 interim year and 2040 planning horizon year. The 2025 travel model output was utilized in the alternatives analysis to understand the timing of certain study area needs. The 2040 conditions presented in this chapter, and used to identify future traffic operation needs, reflect an “existing-plus-committed” (E+C) network. This baseline 2040 E+C scenario assumes that in addition to the current roadway network, only those projects included in the Bismarck-Mandan MPO’s 2015-2018 Transportation Improvement Program (TIP) are constructed. Those expansion roadway projects included in the 2015-2018 TIP are:

- Traffic signal improvements to Bismarck Expressway and University Drive (Bismarck).
- Reconstruction and widening of Washington Street to 4-lanes between Calgary Avenue and 57th Avenue (Bismarck).
- Turn lane additions along State Street / US 83 between Divide Avenue and Calgary Avenue (Bismarck).
- Traffic signal improvements to Memorial Highway / 40th Avenue SE, Memorial Highway / 46th Avenue SE, and Main Street / Twin City Drive (Mandan).
- Reconstruction and widening of Old Red Trail to 3-lanes between Highland Road and 47th Avenue NW (Mandan).
- Intersection improvement (signal and turn lanes or a roundabout) at 66th Street / Highway 10 (Burleigh County).
- Turn lane and safety improvements at Highway 6 / 19th Street SW (Mandan).
- Traffic signal improvements along Main Street between ND Highway 6 and ND Highway 1806 (Mandan).
- Reconstruction and turn lane additions to 27th Street between ND Highway 1806 and 8th Avenue NW (Mandan).

The forecasted 2040 E+C condition daily traffic forecasts are documented in **Figure 6-1**, along with current daily traffic volumes for reference, and future estimates of peak hour traffic operations. As shown in **Figure 6-1**, the projected high growth rate in households and employment will be combined with increased levels of congestion by 2040 (on the existing and committed network). The locations showing a year 2040 E+C condition with LOS D, LOS E, and LOS F were classified as future roadway traffic operations deficiencies, to be considered for improvements. Note that Roadways not shown as LOS D, E, or F in **Figure 6-1** were estimated to be LOS A, B, or C.



Sources: Bismarck-Mandan MPO Travel Model, NDDOT Counts, HCM ARTPLAN, HDR, I-94 Corridor Study, State Street Safety Study

Future 2040 Existing-plus-Committed Network Traffic Forecasts and Peak Hour Operations

Figure: 6-1

Date: November 2014

6.2.1 FUTURE IMPACTS TO NORTH-SOUTH MOBILITY IN BISMARCK

There are 3 improvements to north-south mobility included in the committed project list in the TIP:

- Traffic signal improvements to Bismarck Expressway and University Drive.
- Widening of Washington Street to 4-lanes between Calgary Avenue and 57th Avenue.
- Turn lane additions along State Street / US 83 between Divide Avenue and Calgary Avenue.

Those projects will provide some benefits to north-south mobility when constructed by 2018. However, as development and traffic growth continues through the year 2040, mobility issues and traffic delays are anticipated to increase through 2040. If no other improvements are made to support north-south mobility in Bismarck, the key north-south Bismarck arterial corridors identified in *Chapter 5* will experience continued and increased levels of congestion in the 2040 E+C condition, as indicated in **Figure 6-1**. Specific locations of these increased congestion levels include:

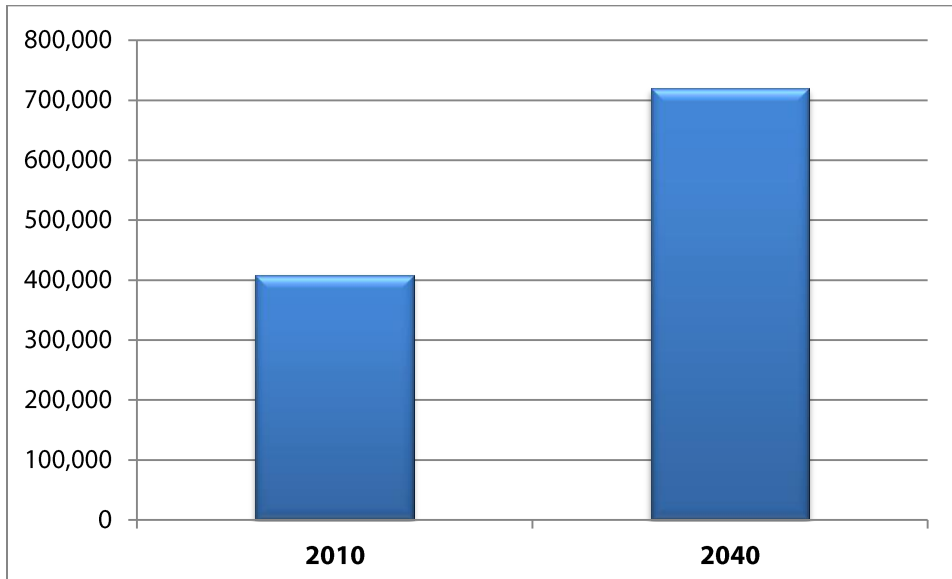
- LOS E/F conditions along Tyler Parkway north of I-94.
- LOS E/F conditions along much of Washington Street between Rosser Street and 43rd Avenue.
- LOS E/F conditions along State Street between 71st Avenue and I-94.
- LOS E/ F conditions for Bismarck Expressway between Century Avenue and Main Avenue.
- LOS F for 80th Street between 71st Avenue and Apple Creek Road.

6.3 FUTURE REGIONAL TRAFFIC ASSESSMENT

Future regional traffic levels were assessed from three different perspectives to set a 2040 performance baseline for the existing-plus-committed (E+C) condition, where it is assumed that no additional transportation projects have been completed beyond those included in the current 2015-2018 Transportation Improvement Program (TIP). By comparing these three regional travel perspectives, the overall travel on the future regional system, and performance measures such as overall regional delay and regional trip length, is understood in a comprehensive manner. The three perspectives include:

- The change in **trips generated** between current conditions and year 2040 conditions indicates how many trips will be made across the MPO study area. Trip generation rates in the Bismarck-Mandan model are assumed to remain constant between 2010 and 2040, so trip generation grows at a rate relatively consistent with the household growth documented in *Chapter 4*, at 76%. **Figure 6-2** illustrates the growth in trips anticipated between 2010 and 2040.
- The change in **vehicle miles traveled (VMT)** between current conditions and 2040 indicates the summarized length of travel across the MPO study area. VMT is a straight-forward calculation of the number of study area trips multiplied by each trip's length in distance. VMT is documented by functional classification in **Table 6-1**. As shown, the VMT between 2010 and 2040 is projected to grow by 115%.
- The change in **vehicle hours traveled (VHT)** between current conditions and 2040 indicates the summarized time spent traveling across the MPO study area. Like VMT, VHT is a simple calculation of the number of study area trips multiplied by each trips time. VHT is documented by functional classification in **Table 6-1**. As shown, VHT between 2010 and 2030 is projected to grow by 256%.

Figure 6-2. Study Area Daily Trips Generated



Source: ATAC, Bismarck-Mandan Travel Model

Table 6.1. 2040 E+C System Performance Baseline: 2010 and 2040 VMT, VHT and System Speeds

Functional Class	Vehicle Miles Traveled		Vehicle Hours Traveled		System Speeds	
	2010	2040 E+C	2010	2040 E+C	2010	2040 E+C
Interstate	260,662	497,754	4,943	9,989	52.7	49.8
Major Arterials	688,300	1,345,633	18,301	56,708	37.6	23.7
Minor Arterials	314,106	770,826	9,367	40,924	33.5	18.8
Collectors	210,938	563,084	6,179	30,607	34.1	18.4
Total System	1,474,006	3,177,297	38,790	138,228	38.0	23.0

Source: ATAC, Bismarck-Mandan Travel Model

Table 6-1 also estimates system speeds, by dividing system-wide vehicle miles traveled by system-wide vehicle hours traveled. There are two items to note when reviewing the information in this section.

- Vehicle miles traveled increases at a higher rate than trips generated. This indicates that the length of trips is forecasted to increase in the future. This is a function of where development is anticipated to occur. Development growth on the fringes of current development creates a spatially larger urban area with greater travel distances.
- The existing-plus-committed scenario, which represents no investment in the transportation system beyond currently-committed projects and programs, shows peak conditions system speeds will decrease significantly due to increased congestion.

6.4 FUTURE TRANSIT AND BICYCLE / PEDESTRIAN DEMAND ASSESSMENT

Trends indicate that younger generations of Americans are more likely to walk, bike, and use transit than previous generations. Data from the FHWA's *National Household Travel Survey* indicates that between 2001

and 2009, the average number of automobile trips made by Americans under 34 dropped by 15%, while trips by walking, biking, and transit all increased. The 2014 *Who's On Board* survey by the TransitCenter found that Americans under the age of 30 (the generation often called "Millennials") used transit at least two times more frequently than those over 30 years old across every region of the US. Similarly, the 2014 report *Millennials in Motion* (U.S. PIRG) cites an Urban Land Institute study that found that 19% of Millennials bike at least once a week, compared with 16% of Generation X (generally those in their early 30s to late 40s) and 12% of Baby Boomers (generally those in their 50s and 60s). It is within this context that the metropolitan area considers future investments in the transit and bicycle / pedestrian systems.

The future 2040 land development scenario used for the LRTP, documented in *Chapter 4*, includes relatively high levels of suburban-scale development on the fringes of the current urbanized area. These development patterns and densities do not tend to generate significant levels of bicycle, pedestrian or transit demand, as they lack three characteristics associated with walkable, bikeable, and transit -supportive environments. The desirable characteristics of a bicycle and pedestrian network include:

- **Density:** providing multiple uses in a relatively compact location, which increases the number of people, trip ends and overall activity within a small area. Areas with high density of services do not rely as much on automobile travel, so walking, biking and transit are more attractive in these environments. From the transportation perspective, dense transportation networks provide multiple travel options and shorter trips, making all modes more competitive with one another.
- **Diversity:** providing a mix of uses and amenities within a location, thereby satisfying many activity needs within a small area. For instance, locating shopping, residential, dining, and office space all within a small area can lead to more walking and biking trips, since many activity needs and ultimately trip ends are nearby. These environments reduce the reliance on automobile trips.
- **Design:** Design is important from both a streetscape and development perspective. Transportation systems that are designed to accommodate all users (similar to the concept of complete streets) provide balanced, safe transportation access for all modes. Similarly, the design of buildings and developments can be oriented to emphasize person-oriented access, rather than vehicle-oriented or parking-oriented access. An example would be buildings oriented to front the street rather than behind a large parking lot. This configuration provides building access directly tied to the street and sidewalk, facilitating short walking distances geared towards improving the pedestrian and transit access environment.

Current trends and projections indicate that much of the future growth on the current urban fringe will not consist of high-transit generating environments.

However, there will be opportunities to improve the overall bicycle and pedestrian connectivity and attract some new trips across many of these growth areas. The future growth concept does anticipate the addition of some new infill employment and housing in downtown Bismarck and downtown Mandan (however, only a small portion of infill compared to the level of suburban development anticipated). The anticipated future additions to population and jobs in these already active downtown neighborhoods should provide some increase to bike, pedestrian and transit demand and opportunities.

Chapter 7 ALTERNATIVES DEVELOPMENT AND EVALUATION

This chapter summarizes the alternatives development and evaluation process used for the 2040 LRTP. A comprehensive list of transportation alternatives was developed to capture the range of reasonable improvements or programs that were considered and further analyzed for potential inclusion in the 2040 LRTP. Alternatives were developed in locations where the technical analyses of existing or future traffic congestion, crash assessment, multimodal system connectivity, or public and stakeholder input indicated a system improvement might be warranted. Once the range of potential multimodal alternatives were developed, the alternatives were screened and then assessed against the performance measures developed for the 2040 LRTP. Extensive public outreach was conducted via several methods to get public feedback on the alternatives, prior to project selection for inclusion in the fiscally-constrained plan. Those methods of outreach included:

- Promoting the alternatives development summary (the range of alternatives being considered) via LRTP social media outlets.
- Placing advertisements on Facebook, targeted to Bismarck, Lincoln, and Mandan residents that linked to the alternatives development summary at the project website.
- Press release announcing the alternatives development summary.
- Mailings to resource agencies to coordinate on the alternatives developed.
- Emails to the stakeholder contact list with links to the alternatives development summary.

7.1 ALTERNATIVES DEVELOPMENT

Issues and needs identified through the initial phases of the public involvement process and the technical analyses were addressed with a range of multimodal alternatives. These potential alternatives were assessed to determine potential inclusion in the plan. A wide range of alternatives were developed in workshop settings with the focus group and the LRTP steering committee, based on feedback received from the public. Information was provided to the alternatives development workshop participants on identified issues, traffic operations needs, safety issues and connectivity gaps to help them identify potential solutions.

Alternatives were developed for each of the modes being considered in the 2040 LRTP, and generally fell within one of three categories, defined in **Figure 7-1**.

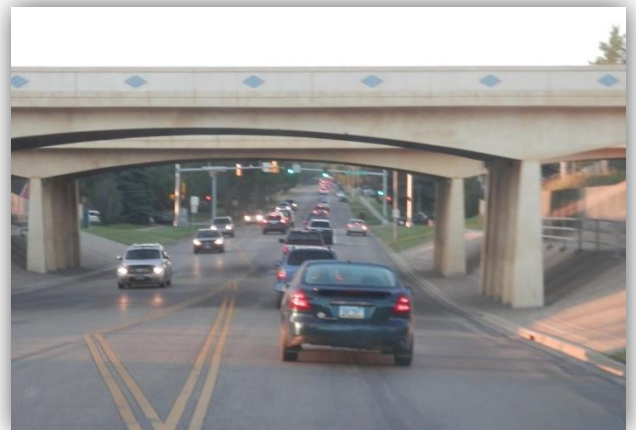


Figure 7-1. Range of Alternatives Developed for LRTP Consideration



7.1.1 ROADWAY ALTERNATIVES

A range of roadway alternatives were developed to address locations where the technical analyses (traffic congestion, traffic safety, system connectivity, etc.) or public and stakeholder input indicated a system improvement might be warranted. Due to the high levels of mobility and safety issues, there was a broad list of alternatives considered. Those alternatives are illustrated in **Figure 7-2**¹⁵. A complete discussion of the roadway alternatives developed is included in [Appendix D](#).

State-of-Good Repair Baseline

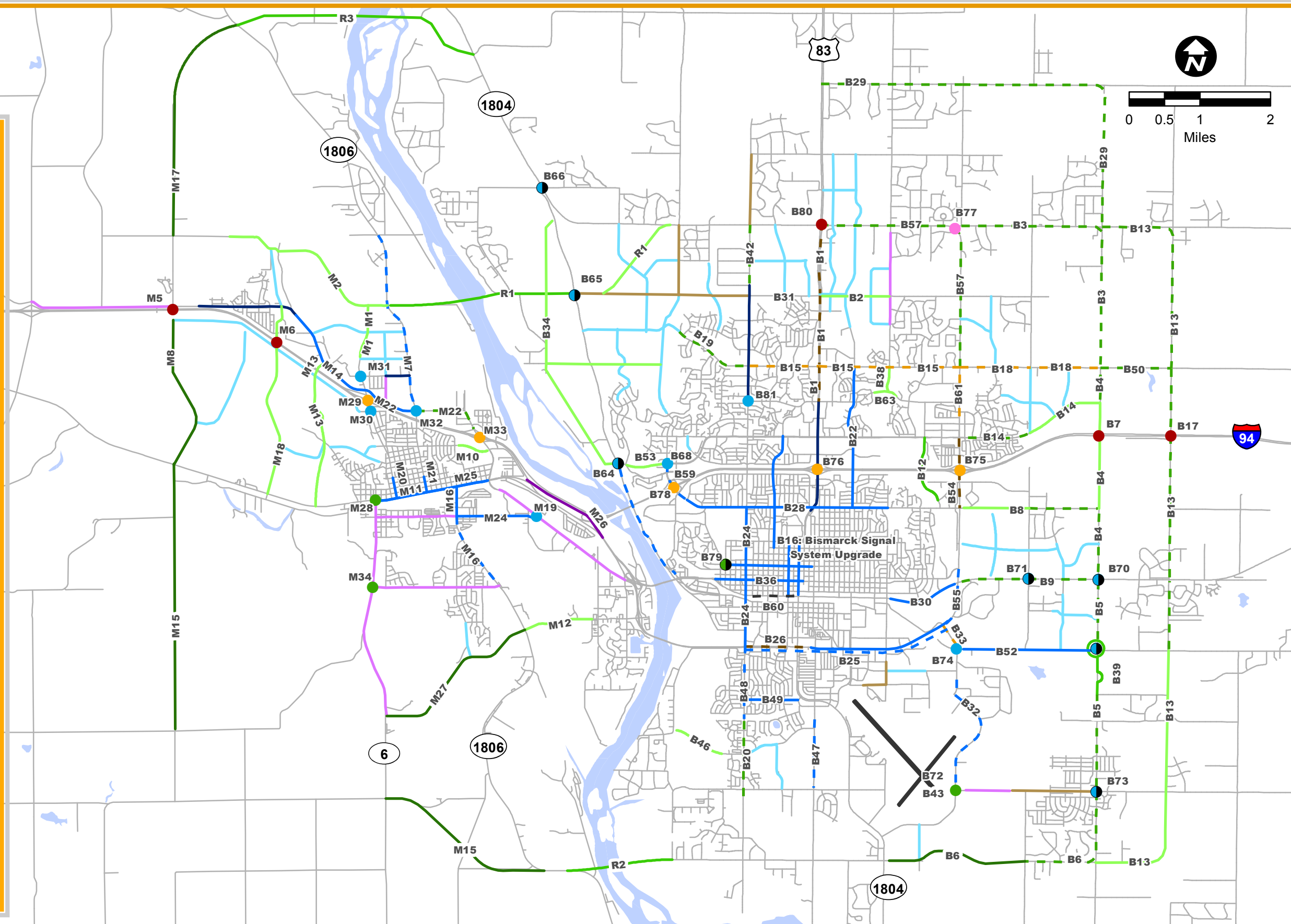
One of the baseline assumptions guiding the development of roadway alternatives, and later assessment of funding and developing the transportation plan, is that a higher share of re-investment in the current roadway system to maintain it was necessary. This assessment is consistent with the findings of the 2012 *Bismarck and Mandan State of the Streets Reports*. More discussion on this will be provided in the funding chapter, but it was assumed that during the year 2015 to 2040 time horizon, an increasing share of project spending for operations and maintenance and state-of-good repair projects is necessary.

¹⁵ Figure 7-2 identifies some projects as "Roundabouts or Signals" or "Roundabouts or Turn Lanes". Both alternatives are carried forward at these locations, as additional detailed traffic operations and design analysis are required before a roundabout is considered the most appropriate alternative. To be conservative, the LRTP cost estimates assume roundabout costs (higher costs) in these locations.

Legend

Roadway Alternatives

- Interchange Reconfiguration
- Intersection Reconfiguration
- New Interchange
- New Roundabout or Signal
- New Roundabout or Turn Lane
- New Signal
- Turn Lane Addition
- "Road Diet" - Convert 4 Lane to 3 Lane
- Interstate Reconfiguration
- New 2-Lane Rural
- New 3-Lane Roadway
- New 3-Lane with Bridge
- Restripe for Turn Lanes
- Widen for Turn Lanes
- Widen to 3 Lanes
- Widen to 4 Lanes
- Widen to 6 Lanes
- Projects in Current TIP
- Short Term Preservation Projects
- Short Term 100% Local Projects
- Developer Funded Roads



Several short-term state-of-good repair projects were identified by local staff during development of the LRTP. These projects are noted in later chapters.

Bismarck Signal System Upgrade

One alternative that would extend across much of the system would be a technology upgrade to the Bismarck signal system. The current Bismarck signal system relies on three different traffic signal manufacturers, with some connections via older phone lines and some connections with new fiber optic connections. Many corridors have connections that allow the signals to work in coordination, but with older technology that is less flexible.

The signal system upgrade alternative would implement several signal system improvements in multiple corridors, including:

- Implementing a central system software upgrade.
- Replacing old controllers, switches and cabinets with newer technology.
- Installing pan-tilt-zoom (PTZ) cameras in key corridors with unobstructed views (Bismarck Expressway, State Street, etc.) to provide live updates to city engineering staff.
- Interconnecting the key pieces of the system with all fiber optic lines.

These upgrades allow for more flexible signal system that can better respond to traffic patterns. During peak period congestion, system upgrades like those listed above often provide a 10-15% decrease in corridor delays. In the longer term, this concept could also involve creation of a Traffic Operations Center for Bismarck. A traffic operations center would require dedicated staff that would monitor incoming information on system performance (speed data, video feeds, etc.) and adjust signal system timings accordingly to improve travel mobility on the system. As the arterial system sees significant increases in congestion through 2040, the benefits of a Traffic Operations Center would likely be a cost-effective investment.



7.1.2 BICYCLE AND PEDESTRIAN ALTERNATIVES

A range of bicycle and pedestrian alternatives were developed to address the needs and system gaps identified in the LRTP.

- For **walking alternatives**, the guiding approach was to develop an effective and useful pedestrian network to provide continuous, well-maintained walking facilities that offer convenient and comfortable connections to useful destinations. Walking facilities in the Bismarck-Mandan region should address the needs of a walking population that ranges from elementary school-age children to senior citizens who may rely on walkers or mobility devices.

- For **biking alternatives**, it was acknowledged that there were two distinct user groups that the non-motorized system serves:
 - The system should accommodate casual users, recreational riders, and the needs of residents who have the same level of tolerance to traffic stress as the general mainstream adult population. In general, these system users will tend to avoid on-street routes on busy streets, and prefer trails and routes with greater separation from motor-vehicles, or routes on low-volume, low-speed residential streets.
 - The system should accommodate the needs of bicycle riders who have a greater tolerance for traffic stress, and who may already be bicycling for transportation or recreation. In general, these users are comfortable riding on busier roads if bicycle lanes are provided, and can also share lane space with motorized traffic depending on traffic conditions.

Pedestrian Alternative Types

- **Sidewalks:** Sidewalks designate space for the exclusive use of pedestrians, and are a foundational element for a system of pedestrian mobility. They are also a vital component of healthy commercial districts, providing access to businesses, space for street furniture and plantings, and for the casual interactions that support community interpersonal connections.
- **Marked crosswalks and advanced stop bars:** Marked crosswalks are a visual indication of locations where pedestrian crossings can legally and safely occur. They help create a continuous network for pedestrians, and improve safety by alerting motorists to the potential presence of a pedestrian at a crossing. They should be used at all traffic-light controlled intersections, and at stop-sign controlled intersections in main street commercial districts. When placed at locations where more than one lane of travel per direction is possible (including turn lanes), they should be combined with Advanced Stop Bars in order to minimize risk of “Hidden Threat” crashes. Advanced Stop Bars are recommended for placement on the roadway at least 10 feet before marked crosswalks.



- Curb extensions / Bump-outs:** Bump-outs extend the sidewalk and curb into the motor-vehicle parking lanes at intersection locations. These features (also known as “neck-downs”) improve safety and convenience by shortening the distance a pedestrian must walk to cross a street; by increasing the visibility of pedestrians to motorists; and by slowing down right-turning motorists. They also decrease the amount of time a pedestrian is in the line of vehicle traffic. Bump-outs work especially well on busy collector streets, on minor arterials where on-street parking is allowed, and in commercial / downtown districts.
- Medians / Pedestrian refuge islands:** Crossing islands simplify pedestrian crossings and improve safety by dividing the crossing movement into two stages so that pedestrians only cross one direction of traffic at a time. They make crossing high volume roads safer and easier, and allow slower walkers, including children and seniors, to cross wider roads without worrying about getting stranded in the middle of the crossing. This treatment can also provide significant benefits for bicycle riders.
- Pedestrian Hybrid Beacon / HAWK signal:** The Pedestrian Hybrid Beacon (PHB, also known as HAWK or High-Intensity Activated crossWalk) is a pedestrian-activated red-indication signal designed for use at intersection and midblock locations. PHBs, while relatively new to the US, have been in use in Europe for decades and have been successfully deployed in North American cities like Tucson, AZ; Lawrence, KS; and Vancouver, BC. Similarly, the **Rectangular Rapid Flashing Beacon (RRFB)**, or RRFB, is a pedestrian-activated signal that uses an irregular “stutter” flash pattern with very bright amber lights (similar to those on emergency vehicles) to alert drivers to yield to the pedestrians who wish to cross a road.
- Leading Pedestrian Interval (LPI):** A Leading Pedestrian Interval (LPI) is a traffic signal programming practice that sets the pedestrian walk sign to occur several seconds before the ‘green light’ at the parallel street. This gives pedestrians a head start into the intersection so that they are more easily seen when cars begin to move forward. The LPI is typically three to five seconds, and requires only reprogramming of the light sequence and no additional equipment, making it an excellent low-cost solution.



Bicycle Alternative Types

- Bike Lanes:** Bike lanes designate a portion of the roadway for preferential use by bicyclists. Lanes are defined by striping, pavement markings and signage. Bike lanes allow cyclists to travel at their own speed in a space separate from motor vehicle traffic, and increase cyclist comfort and visibility. The minimum recommended width for a bike lane is 5 ft. On some roads, space availability may be a constraint; however, implementing a "road diet" or decreasing the width of travel lanes (down to 11 feet or 10 feet in urban settings) can free up additional roadway space without reducing motor-vehicle traffic capacity or flow. If bicycle lanes are provided adjacent to a parking lane in busier commercial districts, concerns about "dooring" crashes (when a driver opens their door onto the path of the cyclist riding on a lane) may arise - a wider, or buffered bicycle lane should be considered in these cases.
- Buffered Bike Lanes:** Buffered bike lanes are regular bicycle lanes that include additional space between the bike lane and moving traffic, and/or adjacent parking lanes. Buffered bicycle lanes increase rider comfort by increasing their separation from motor-vehicles, and can improve safety by reducing the likelihood of "dooring" crashes (described above). Buffered lanes can provide cyclists with adequate room to pass each other without having to merge into lanes of moving automobile traffic.
- Neighborhood Slow Streets:** A Neighborhood Slow Street (also sometimes known as a Neighborhood Greenway or a Bicycle Boulevard) is a neighborhood residential street modified to calm automobile traffic and discourage cut-through traffic to make walking and bicycling on those streets more inviting and comfortable. Certain treatments can be applied at intersections to further calm traffic and offer additional priority to pedestrians and cyclists. A speed of twenty miles per hour should be the target motor-vehicle speed on bike boulevards after traffic-calming treatments are applied.



Neighborhood Slow Streets are appropriate for residential streets with initial Average Daily Traffic volumes of 4,000 or less, and are especially useful if they are used to develop a route network that provides access to the destinations typically located along busier roads carrying high speed or high volume traffic. Neighborhood Slow Streets are an effective way of creating lower stress connections for bicycles in the network and



Courtesy of TLC Minnesota

are appropriate for many residential streets in Bismarck and Mandan. A network of Neighborhood Slow Streets can help develop a broad network connecting residential areas with other routes and destinations.

- Shared-Use Paths and Sidepaths:** Off-road shared-use paths, also known as multi-use trails, offer completely segregated space away from the street for pedestrians, bicyclists, and other users of non-motorized transportation. These paths often link parks and other recreation destinations, and some serve broader regional connection purposes. Shared-use paths can also exist in the form of shared use “sidepaths” - sidewalk-like facilities paralleling roadways and providing a space for pedestrians and bicyclists to access commercial, residential, and retail destinations. This is common in Bismarck and Mandan. It is important to consider treatment of the sidepath at intersections, as they may bring bicycle riders into the intersection from directions where motorists are not expecting them. Sidepaths are best suited to locations with no or very few intersections or driveways.
- Cycletracks:** A cycletrack is an exclusive lane for cyclists separated from motor-vehicle traffic by a painted buffer and/or physical barrier (such as a curb, parked cars, or bollards), and separated and distinct from the sidewalk. Different forms of cycletracks include one-way protected cycletracks, raised cycletracks and two-way cycletracks. Cycletracks significantly increase bicycle ridership for people of all ages and experience levels because the significant separation from motorized vehicles greatly increases rider comfort. Cycletracks require more space and infrastructure than conventional bike lanes, and require special design attention at intersections. Cycletracks are the preferred on-street bicycle accommodation where the right-of-way space allows for its installation.
- Extending Bicycle Lanes Through Intersections:** Intersections have the greatest risk for conflicts between roadway users. Extending bicycle lane markings at and through intersection conflict points warns bicyclists and motorists where movements may conflict and provides clarity to guide traffic flow.



Bicycle lanes lines may be dashed/broken where motorists are allowed to enter the bike lane including locations where drivers may perform a right turn maneuver, as well as at bus stops, and bus pullouts. Bike lane striping should remain solid at minor unsignalized driveways or alleys. At major driveways, bike lane lines may be discontinued, however dotted lines are recommended. Contrasting green paint can be applied to bring further attention to conflict points along bike lanes, and to identify locations where bicycle lanes continue through intersections. Motorists are required to yield to bicyclists at the entrance to right-turn-only lanes. Signage reminding drivers to yield may be used to remind motorists that it is their responsibility to yield to bicyclists continuing forward in the bike lane.

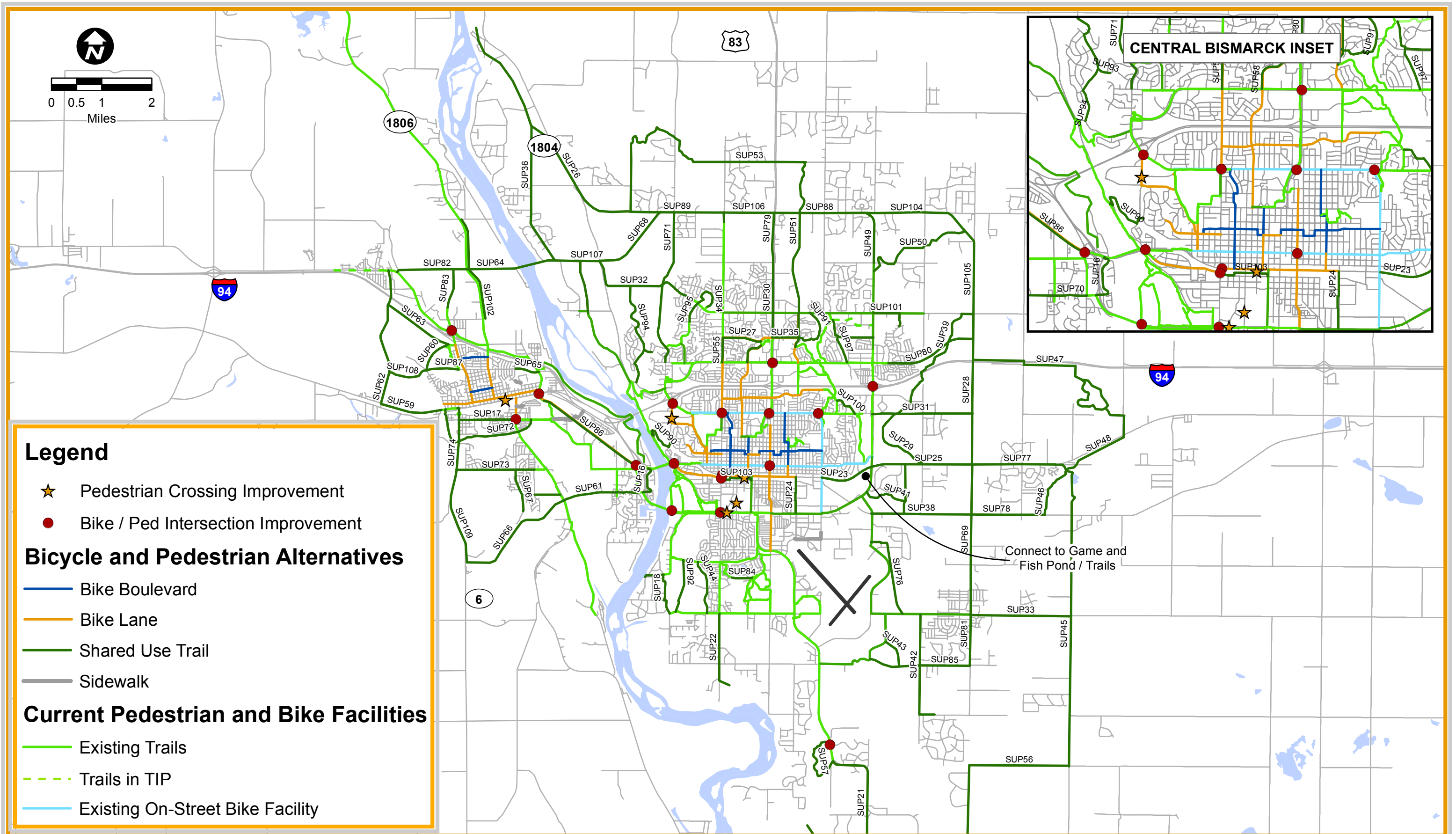
- **Protected intersections:** Protected intersections extend the benefits of cycletracks to intersections, where bicyclists face the highest potential for conflicts with motor vehicles. Protected intersections include four main elements:
 - A corner refuge island
 - A forward stop bar for bicyclists
 - Separate, set-back bike and pedestrian crossings
 - Bicycle-friendly signal phasing (a Leading Bike Interval, akin to the Leading Pedestrian Interval).

Guidance on protected intersections will be included in the forthcoming third edition of the National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide*. Use of the NACTO guide is recommended by the Federal Highway Administration (FHWA) to supplement materials from the American Association of State Highway and Transportation Officials (AASHTO).

The range of bicycle and pedestrian alternatives considered is illustrated in **Figure 7-3**. Specifically, the treatments for each alternative type shown include:

- **Pedestrian Crossing Improvements** such as Pedestrian Hybrid Beacon (HAWK) or Rectangular Rapid Flashing Beacon (RRFB) crossings, improved signage and striping for non-signalized crosswalks, and / or pedestrian refuge median treatments.
- **Bike / Pedestrian Intersection Improvements** such as curb extensions / bump outs, leading pedestrian interval (LPI) signals, extended / marked bike lanes through intersections, and / or protected intersections.
- Bike Boulevards.
- **Bike Lane** improvements, such as on-street bike lanes, buffered bike lanes, or cycle tracks.
- **Shared Use Trails.**
- **Sidewalk Improvements.**

Full documentation of the bicycle and pedestrian alternatives is provided in [Appendix E](#).



7.1.3 TRANSIT ALTERNATIVES

A comprehensive transit planning study was completed for the Bismarck-Mandan metropolitan area in 2012, the *Bismarck-Mandan Transit Development Plan* (TDP). The TDP was called *Mobility 2017: Transit Roadmap for Bismarck and Mandan*. The study's main goal was to provide a review of transit services in the area, to promote a sustainable transit program, while keeping up with the demand. *Mobility 2017* was similar in many ways to a Long Range Transportation Plan since it:

- assessed the quality of service on the current system,
- looked at future trends,
- identified gaps / needs in service,
- developed a list of potential alternatives to address those needs, and
- Identified a locally-preferred, financially constrained implementation plan.

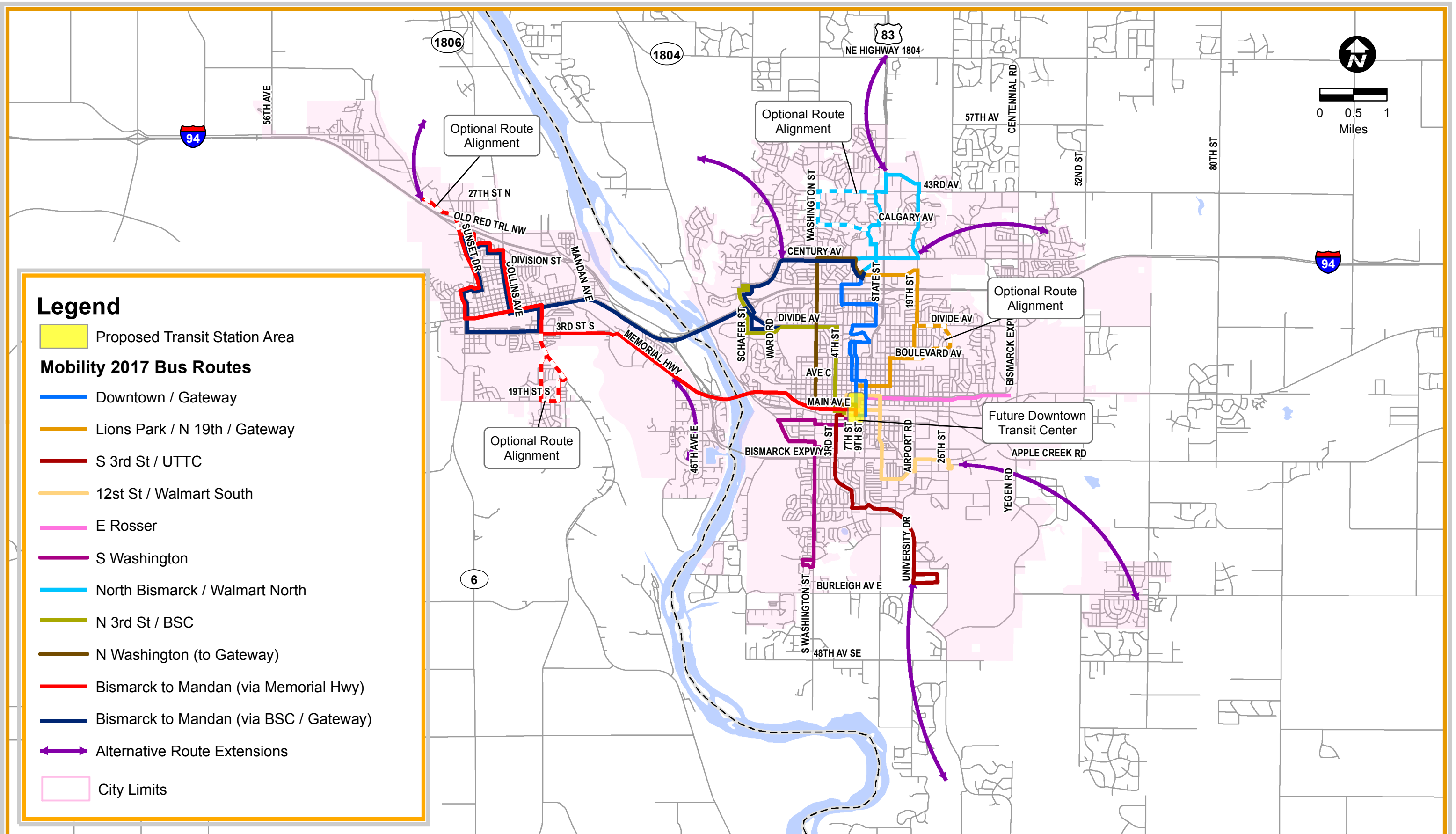
Mobility 2017 differed from the 2040 LRTP in that it was a 5-year transit study, consistent with the window often used for transit plans. Through the detailed analysis and public input process completed for *Mobility 2017*, recommendations were included that addressed both transit systems in Bismarck-Mandan: the fixed route bus system called Capital Area Transit (CAT) and the door-to-door demand response system called Bis-Man Paratransit.

Fixed Route Alternatives

Service expansion alternatives (and ultimately recommendations) were developed that achieve the following objectives:

- Increase funding and improve service headways / frequencies to a minimum of 60 minutes during the midday, 30 minutes during peak times.
- Match service levels with demand, focusing on enhancing ridership rather than providing coverage throughout the region.
- Eliminate one-way loop routes. Bi-directional service provides the most direct routing and eliminates confusion associated with service that is provided in only one direction.
- Minimize or eliminate double transfers. With the exception of one route in north Bismarck, all routes would pulse into and out of a single transfer location.
- De-emphasize service to elementary and middle schools, allowing for school tripper service if necessary.
- Establish a transit hub in central Bismarck, with coordinated routes timed with minimized wait times.

The fixed route bus service alternatives (including the *Mobility 2017* alternatives / recommendations) are included in **Figure 7-4**.



Bis-Man Paratransit Service Alternatives

An area of emphasis in *Mobility 2017* is that enhancing the CAT fixed route service to benefit everyone, including many current users of the Bis-Man Paratransit service. Thus, it was recommended to fund improved CAT fixed route service by shifting some resources from paratransit to the fixed routes. These principals guided the paratransit service alternatives, and ultimately that study recommended:

- People who are able to use CAT should use CAT; Bis-Man Paratransit should be considered a service, or “safety net”, limited to those whose disability prevents their use of CAT.
- Any cost savings resulting from curtailing the use of Bis-Man Paratransit by those who can use CAT should be dedicated to improving CAT.
- Any changes to Bis-Man Paratransit should be rolled out simultaneously with improvements to CAT and should be presented to the public as a comprehensive service enhancement plan.
- Revisions to Bis-Man Paratransit service policies or eligibility criteria should be phased in over time.
- Bis-Man Paratransit/CAT staff should develop a comprehensive public outreach and media campaign to inform and educate members of the public of proposed changes before and during the time any revisions are implemented, as well as closely informing its own Board of Directors of the tradeoffs involved.

Specific alternatives / recommendations from *Mobility 2017* for paratransit service were:

- Maintain the high quality of service offered by Bis-Man Paratransit.
- Bis-Man Paratransit is encouraged to revise certification criteria to be consistent with ADA requirements. This means that eligibility for Bis-Man Paratransit should be based on whether or not the applicant has a disability that prevents use of fixed-route transit service.
- Bis-Man Paratransit should revise the eligibility process by which applications are reviewed and certified, and should consider an in-person assessment to carefully and thoroughly document whether or not the applicant is able to use CAT and, if not, what conditions or circumstances prevents use of CAT. Some individuals may be deemed conditionally eligible, and could use Bis-Man Paratransit some of the time rather than all of the time.
- Bis-Man riders’ eligibility status does not expire. It is reasonable to expect users of the service to recertify their eligibility status every few years.
- Bis-Man Paratransit should complement CAT. These services should ideally operate within the same service area. Service to Lincoln and the University of Mary should be funded by these entities in order to continue to be provided.
- One alternative that would allow Bis-Man Paratransit to provide service where or when CAT does not operate would be to consider such trips as “premium service” and charge a premium fare.
- The transit system should invest in the purchase of several (three or four) wheelchair-accessible taxi vehicles in order to provide more flexibility to the fleet and to improve mobility options for residents and visitors of the Bismarck-Mandan area.

7.1.4 MULTIMODAL REGIONAL ALTERNATIVES

There were several additional alternatives that were developed for consideration through the 2040 LRTP development phases that were both regional and multimodal in nature. These strategies are intended to advance improved mobility in the Bismarck-Mandan region today and into the future. These alternatives are shown in **Figure 7-5**.

Figure 7-5. Multimodal Regional Alternatives



The following bullets summarize the multimodal regional alternatives being considered.

- Regional Travel Demand Management (TDM) Program:** TDM programs are a set of programs developed to complement and enhance the multimodal system by reducing the desire for travel by personal automobile during peak travel times of the day. The TDM tools that are most effective will vary from region to region. TDM is most beneficial in urban areas or subareas with high levels of congestion and high travel and parking costs. As noted in the 2035 LRTP, communities such as Bismarck-Mandan that have historically had low levels of congestion and high levels of parking availability have had little reason to implement TDM programs. However, given the high levels of development growth, and the resulting levels of traffic growth and congestion anticipated through 2040, a TDM program would be a more effective option in the future. Elements that might be part of a TDM program in Bismarck-Mandan include:
 - Flexible Work Schedules / Telecommuting*, to encourage commuters to make their trips outside of the peak period of travel, or to work from home. These programs can be administered through an organization of employers that coordinate flexible schedules and other TDM activities to provide more effective strategies.
 - Rideshare programs*, including carpooling and vanpooling. The aim of these programs is to get more commuters into each car and increase vehicle occupancy rates. These programs can be organized at the regional or employer-level via web-based trip matching.

There are several additional elements that can be used to leverage these programs, including marketing, guaranteed ride home, financial incentives, parking policies, and a robust bike / pedestrian / transit system to supplement automobile travel.

- **Complete Streets Policies:** Complete Streets are streets that are designed to accommodate safe access and use for all multimodal users; pedestrians, bicyclists, motorists, transit riders of all ages and abilities. Complete streets policies are becoming common across the U.S., and often cover both new and retrofit projects. Policies set guidelines for design elements by roadway types, encourage high levels of street connectivity, and are intended to fit within neighborhood context.
- **Trail Dedication Policies for New Developments:** Through the public engagement efforts in the plan, several stakeholders mentioned a desire for consistent dedication of new trails when new subdivisions and developments occur. Standardizing the location and type of connections these neighborhood trails should make, over time, more complete and comprehensive trail access for the residents of Bismarck-Mandan.
- **Transit and Bike / Pedestrian Promotion Programs:** An effort to independently promote the environmental, community, and health benefits of walking and biking each on their own would have little impact for the overall area. Rather, a comprehensive package of infrastructure and educational components describing how alternative travel modes can work together would have a positive impact for biking, walking, and transit usage in the region.
- **Land Use Policies to Support Infill Development:** Policies promoting and providing incentives for infill and mixed use developments would improve the range of travel options in Bismarck-Mandan.

7.2 ALTERNATIVES ASSESSMENT

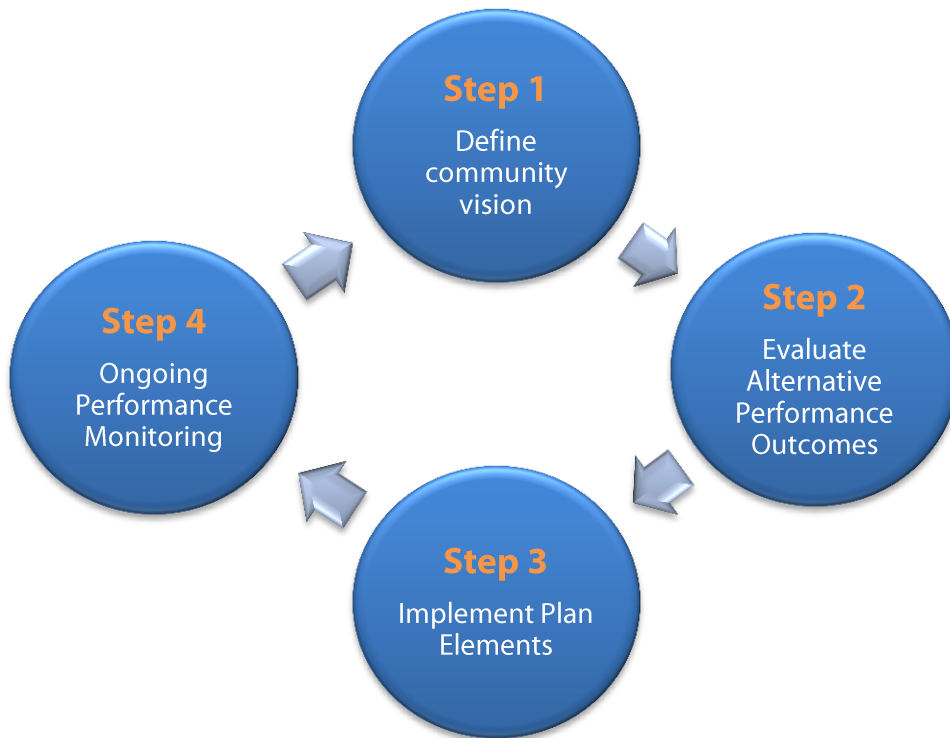
Once the range of alternatives was developed, the next step was to perform technical analyses of performance in the alternatives assessment phase of the study.

7.2.1 PERFORMANCE MEASURES FOR ALTERNATIVES ASSESSMENT

Performance measures are used to provide a means of evaluating progress towards goals and objectives, to help in making informed investment and policy decisions. Performance measures allow comparison of transportation improvement alternatives and track performance over time. This section focuses on using those performance measures to make decisions on alternatives.

As noted in *Chapter 1*, the MAP-21 authorization has formalized performance-based transportation planning. While the Bismarck-Mandan MPO has utilized performance measures on past planning efforts, the renewed emphasis on performance measures formalizes and standardizes the process with consistent metrics. The 2040 LRTP represents the initiation of the performance-based transportation planning process.

Figure 7-6 illustrates the general process involved in performance measurement and transportation planning, with the second element “Evaluating Alternative Performance Outcomes” the focus of the alternatives assessment phase of the 2040 LRTP.

Figure 7-6: Performance-Based Planning Process

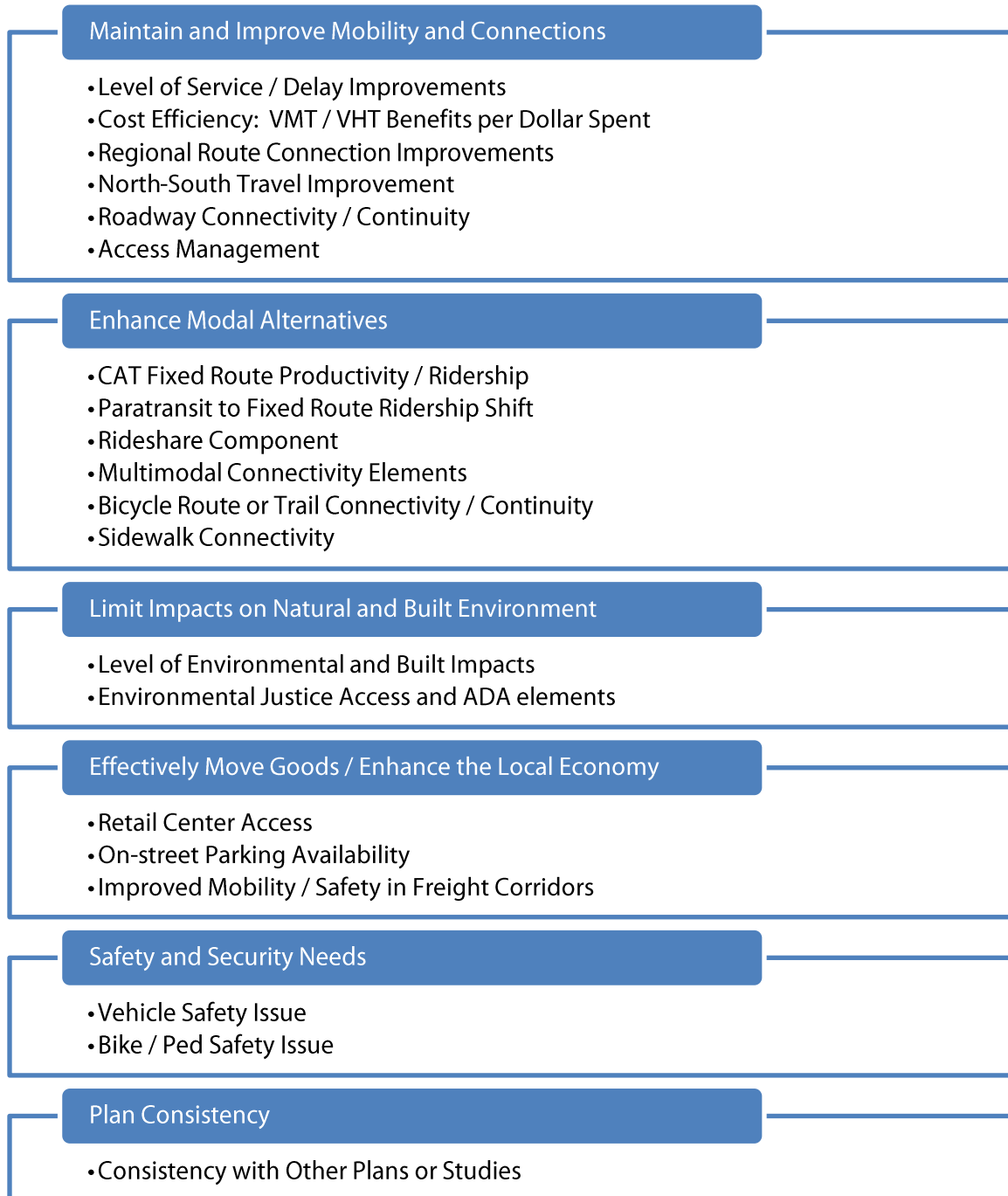
During development of the 2040 LRTP, MPO staff had begun to develop initial performance measures that would be used by the MPO for ongoing monitoring. This was not yet a formalized set of performance measures, as the rulemaking for performance measurement is not finalized. Once finalized, the NDDOT and North Dakota MPOs will work together and agree to a set of performance measures used for metropolitan transportation planning.

In the absence of formalized performance measures, the 2040 LRTP created a set of performance measures that reflected:

- Direction provided by MAP-21 and the draft rules that had been released as of June 2014 when the alternatives analysis task was underway.
- The community vision, goals, and objectives developed for the 2040 LRTP.

The performance measures used for the LRTP are documented in **Figure 7-7**.

Figure 7-7. Alternatives Performance Areas and Measures



7.2.2 ALTERNATIVES PERFORMANCE SCORING

The role of performance measures in the alternatives assessment phase was to evaluate how well each project would incrementally move the region closer to its long-term performance objectives. A scoring system was established, tied back to the performance measures documented in **Figure 7-7**. The

performance measures are multimodal in nature, and some of the measures noted above fit better with roadway alternatives, while others were a better fit for transit or bicycle and pedestrian alternatives.

The scoring system used for the alternatives assessment is documented in **Table 7-1**. The scoring results were used as a basis for evaluating the relative merits of each alternative in relation to the community vision and the national planning goals. The ultimate results of the scoring were not intended to be the “final answer” in terms of project selection. Rather, the scoring is intended to provide guidance on how well each alternative addresses the range of transportation priorities identified by the community. In some cases, it is reasonable to select projects for inclusion in the LRTP based on information not easily summarized by these composite performance scores. However, the alternatives scoring approach is a good basis for placing priorities on improvement strategies for the LRTP.

In general, for each of the performance criteria, the scoring system follows the approach shown below.



+2 points. The highest tier of benefits for that performance measure.



+1 points. Not the highest tier of benefits, but still a beneficial project based on that performance measure.



0 points. A neutral project based on that performance measure.



-2 points. A project with impacts / negative aspects based on that performance measure.

Table 7-1. Alternatives Assessment Performance Scoring

LRTP Project Performance Perspective	Alternative Project Scoring				Scoring Discussion	Related LRTP Objective
	+2	1+	0	-2		
	Very Good	Good	Neutral	Poor		
Maintain and Improve Mobility and Connections						
Level of Service / Delay Improvements	Improves failing corridor to LOS D or better in improvement corridor; or significantly improves travel reliability.	Improves traffic operations in existing corridor; or diverts traffic to improve adjacent corridor operations.	Limited effect on traffic operations.	Degrades traffic operations.	Apply to existing and future traffic levels as appropriate.	1A
Cost Efficiency: Projected VMT / VHT Benefits per Dollar Spent	Highest ranking tier of benefits / dollar spent.	Next tier of benefits / dollar spent.	Limited benefits / dollar spent OR cannot measure.	Negative VMT / VHT benefits.	Compare VMT and VHT reductions to cost. Rank projects against one another.	1B
Regional Route Connection Improvements		New arterial or freeway facility that is 1 mile long or longer.	No effect on arterial or freeway mileage.	Elimination of Arterial or Freeway.	This is a regional priority, but overlaps with other connectivity measures, so only +1 potential.	1C
North-South Travel Improvement		Improves traffic operations for north-south corridor.	No traffic operations effect for north-south corridor.		This is a regional priority, but overlaps with other mobility measures, so only provided +1 potential.	
Roadway Connectivity / Continuity	New roadway connection where a gap of 1/2 mile or more existed before.	Provides a new connection between two existing roadways	No change roadway connectivity.	Reduces roadway connectivity.	Determine distance of new road to nearest existing road. Needs to complete connection between existing roads.	1D
Access Management	Alternative makes access levels consistent with policy where they are not today.	Alternative makes access levels more consistent with policy than current levels.	No effect on access levels.	Alternative makes access levels less consistent with policy.	Compare to access management policies by jurisdiction. Most alternatives likely not measurable for access benefits.	1E

Table 7-1. Alternatives Assessment Performance Scoring (continued)

LRTP Project Performance Perspective	Alternative Project Scoring				Scoring Discussion	Related LRTP Objective
	+2	1+	0	-2		
	Very Good	Good	Neutral	Poor		
Enhance Modal Alternatives						
CAT Fixed Route Productivity / Ridership	Increase in transit efficiency / effectiveness to improve fixed route competitiveness.		No change in transit service / competitiveness.	Decrease in transit efficiency / effectiveness.	Assumes that lower headways / more frequent service or reduced route travel time leads to higher ridership.	2A
Paratransit to Fixed Route Ridership Shift	Potential to shift rides to fixed route from paratransit.		No effect on shifting trips from paratransit to fixed route.		Only score paratransit specific alternatives for this criterion.	
Rideshare Component	Improves rideshare / transit options for commuters into Bismarck-Mandan.		No change in rideshare / transit options for Bismarck-Mandan commuters.	Reduces rideshare / transit options for commuters into Bismarck-Mandan.	Does project address rideshare.	2B
Multimodal Connectivity Elements	Highest ranked tier of improved connections between various modes.	Next tier of improved modal connections.	No change in modal connections.	Degrades connections between various modes.	Ranks alternatives that enhance connections between modes - many projects will score "0".	2D
Bicycle Route or Trail Connectivity / Continuity	New bicycle / pedestrian connection where gap of 1/2 mile or more existed before.	Provides a new connection between two existing bike / pedestrian facilities.	No change in pedestrian / bike facility mileage.	Reduction in pedestrian / bike facility mileage.	Determine distance to nearest existing facility. Needs to complete a connection between two existing facilities.	2E
Sidewalk Connectivity	Provides sidewalk connection to neighborhoods and commercial areas currently disconnected.	Provides sidewalk connection where none exists today.	No change in sidewalk connections.	Reduction in sidewalk connections.	Consider sidewalks that connect currently disconnected neighborhoods / subareas get highest score.	
Limit Impacts on Natural and Built Environment						
Level of Environmental and Built Impacts	Highest ranked tier of reduced transportation system impacts with no major system impacts.	Next tier of reduced transportation system impacts.	No overall effect on transportation system impacts.	Project would overall increase transportation system impacts.	Several factors such as projected VMT, VHT, property impacts, potential threatened and endangered species, wetlands and floodways.	4D

Table 7-1. Alternatives Assessment Performance Scoring (continued)

LRTP Project Performance Perspective	Alternative Project Scoring				Scoring Discussion	Related LRTP Objective
	+2	1+	0	-2		
	Very Good	Good	Neutral	Poor		
Limit Impacts on Natural and Built Environment (continued)						
Environmental Justice access and ADA elements	Incorporates new ADA elements, or directly improves mobility for EJ populations.		No effect ADA elements, or EJ mobility.	Project decreases ADA elements or degrades mobility for EJ populations.	Part of EJ analysis. Sidewalks already included as a part of bike / pedestrian access.	4E
Effectively Move Goods / Enhance the Local Economy						
Retail Center Access	Highest ranked tier of projects that improve access to retail center.	Next tier of improved retail access projects.	Project does not change access to retail center.	Project degrades access to retail centers.	Retail centers are top 10 retail TAZs in metro area and downtowns.	5C
On-street Parking Availability	Improves availability of public parking.		Does not change availability of public parking.	Decreases availability of public parking.	Relevant to TSM options and bike lane options that affect on-street parking. -1 for limited parking loss.	
Improved Mobility / Safety in Freight Corridors	Highest ranked tier of projects improving freight mobility or safety in freight corridor or future freight corridor.	Next tier of improved of improved freight mobility / safety in freight corridor or future freight corridor.	Project does not affect freight mobility or safety.	Project negatively impacts freight mobility or safety in freight corridor.	Truck routes, rail crossings. Improved geometrics or VHT in freight corridor. Highest rankings adjacent to industrial development.	5A
Safety and Security						
Vehicle Safety Potential	Project directly addresses an identified vehicular or bicycle/pedestrian safety issue area.	Improves vehicular or bicycle / pedestrian safety in area not identified for safety; or improves safety by traffic diversion from a safety issue corridor.	No effect on vehicular or bicycle / pedestrian safety.	Project would increase safety concerns at an identified vehicular or bicycle / pedestrian safety issue area.	Does the project address some of the potential contributing factors.	6A
Bike / Ped Safety Potential						
Plan Consistency						
Consistency with Other Plans or Studies	Project is consistent with results of other plan or study.		Project not addressed in another study.	Project is inconsistent with other Plan / Study.	Was project included as a recommendation or technically feasible alternative.	

The appendices provide summaries of the Alternatives Assessment completed for the 2040 LRTP for Roadway (Appendix D) and Bicycle and Pedestrian (Appendix E). Those items provided include:

- Roadway Alternatives Assessment Documentation
- Bicycle and Pedestrian Alternatives Assessment Documentation
- Transit Alternatives Assessment Documentation
- Performance Measure Scoring

Chapter 8 FUTURE TRANSPORTATION FUNDING

8.1 OVERVIEW

A key element of the 2040 LRTP is providing a financial plan that demonstrates how the projects and programs included in the transportation plan can be implemented. The requirements of the LRTP financial plan are provided in 23 CFR 450.322(f) (10). The financial plan reflects reasonably expected system-level estimates of construction costs and revenue sources through 2040. Thus, the list of projects included in the *2015-2040 Bismarck-Mandan Long Range Transportation Plan* is fiscally-constrained.

The LRTP fiscal plan approach is based on methodology included in the *Financial Planning and Constraint Planning Tools for Transportation* guidance offered by Federal Highway Administration (FHWA). This methodology develops the planning horizon (20+ year) financial plan forecasts by using the current year Transportation Improvement Program (TIP) as the basis for extrapolating funding forecasts through the 20+ year horizon. The LRTP team expanded on the FHWA methodology by capturing a longer period of historical transportation construction funding in developing the baseline for funding forecasts. The transportation construction funding forecasts used for the LRTP are based on analysis of the MPO TIPs from 2007 through 2014, and were cross-referenced against NDDOT STIPs for the same periods. In addition to the historical TIP funding data (which are a combination of Federal, State, and Local match spending), other local jurisdictional transportation funding provided by the Cities of Bismarck and Mandan were incorporated into the analysis and forecast.

This chapter provides an overview of the funding approach used for development of the LRTP, and the levels of reasonably-expected funding through 2040. The analysis assumes no major changes (increases or decreases) in funding sources between today and 2040; for instance, no increases in the fuel taxes or no large influx of locally-collected revenues.

8.2 EXISTING SOURCES

Funding of the Bismarck-Mandan transportation system comes primarily from three different levels of government: Federal, State, and Local. For those projects that are Federal-aid eligible, there are two distinct sets of funding programs: Roadway (including bicycle and pedestrian) from FHWA sources and Transit from FTA sources.

8.2.1 EXISTING FEDERAL-AID ROADWAY, BICYCLE, AND PEDESTRIAN FUNDING

Federal-aid road and bridge funding can be applied to roads on the National Highway System (NHS) or roads that are functionally classified as collector or arterial. Under MAP-21, in 2012 funding for bridges and Federal-aid roads was consolidated from multiple programs in previous transportation authorizations into two primary programs:

- **National Highway Performance Program (NHPP):** The NHPP Program provides funding to support the condition and performance of the National Highway System (NHS).

- **Surface Transportation Program (STP):** The STP program is a relatively flexible funding source that may be used by states and localities for projects to preserve or improve conditions and performance on any Federal-aid road. The STP also provides funding for all public road bridges.

The NDDOT has several funding programs it provides for all Federal-aid funding it administers. These programs include:¹⁶

- **Interstate Program:** used to fund mainline Interstate system improvements, new interchanges to relieve congestion at existing interchanges, and reconfigured interchanges where cross-street traffic is not the source of the congestion.
- **Urban Regional Program:** used to fund improvements on the regional (primary or secondary) system.
- **Urban Road:** used to fund improvements on the urban roads or regional (primary or secondary) system.
- **Secondary County Program:** used to fund construction and construction engineering on the County Major Collector (CMC) system.
- **Bridge Program:** used for bridges that need rehabilitation. The matching ratio in this program is 80 percent federal and 20 percent local. Under MAP-21, the Federal off-system bridge program has been merged into the STP.
- **Safety Program:** used for improvements to correct a safety hazard or potential safety hazard on the Interstate, regional (primary or secondary), urban roads systems, and county roads systems.
- **Transportation Alternatives Program (formerly the Transportation Enhancements Program):** The transportation enhancements program was eliminated in MAP-21, and is now the Transportation Alternatives Program (TAP). NDDOT provides this type of funding for projects that support:
 - Pedestrian or bicycle facilities or trails
 - Acquisition of scenic easements and scenic or historic sites
 - Scenic or historic highway programs
 - Landscaping and other scenic beautification
 - Historic preservation
 - Rehabilitation and operation of historic transportation buildings, facilities
 - Preservation of abandoned railway corridors, including conversion for use as trails
 - Control and removal of outdoor advertising
 - Archeological planning and research
 - Mitigation of water pollution due to highway runoff

There are various requirements for each of the programs, and past funding for many of the categories varies from year to year within the Bismarck-Mandan MPO area as some of the sources are formula apportioned, and others are discretionary allocations. Thus, forecasting future revenues based on a snapshot of recent funding levels may be misleading. Additionally, with the consolidation of funding categories due to MAP-21, some of the historical funding categories will not be maintained going forward. The 2040

¹⁶ NDDOT Local Government Manual, May 2008.

LRTP uses an 8-year (2007-2014) fiscal plan for roadway funding levels at the Federal, State and Local levels as a reasonable baseline from which to project future funding levels.

Table 8-1 provides details on non-transit transportation project / program funding, based on the review of the 2007 through 2014 TIP documents. Each project included in those TIPs is placed into general funding categories.

Table 8-1. Breakdown of Non-Transit Funds in 2007-2014 TIPs (in 2014 Dollars)

Funding Program Type	Funding by Level of Government			Total
	Federal	State	Local	
Urban, Regional and Rural STP	\$68,321,000	\$5,396,000	\$16,537,000	\$90,254,000
Interstate	\$29,905,000	\$3,518,000	\$0	\$33,423,000
Other STP Funds	\$15,559,000	\$2,960,000	\$3,599,000	\$22,118,000
Bicycle and Pedestrian Programs	\$9,815,000	\$1,069,000	\$1,617,000	\$12,501,000
Safety	\$12,497,000	\$1,132,000	\$257,000	\$13,886,000
Bridge Programs	\$36,495,000	\$3,592,000	\$1,119,000	\$41,206,000
Total Funding	\$172,592,000	\$17,667,000	\$23,129,000	\$213,388,000

Source: 2007 to 2014 Bismarck-Mandan MPO TIPs

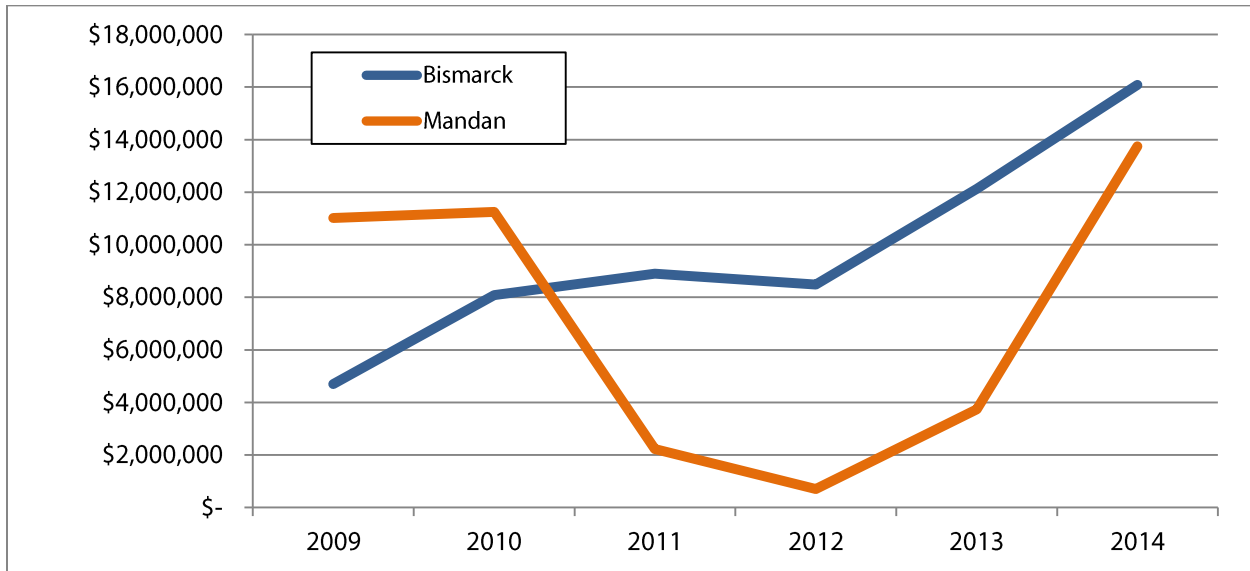
8.2.2 EXISTING LOCAL ROADWAY FUNDING

Local jurisdictions spend significant levels on transportation projects that are 100 percent locally-funded. These projects do not involve any Federal aid, and are not reflected in the TIP projects for 2007 through 2014. The projects funded with local-only monies from Bismarck and Mandan were preservation projects, and involved limited expansion of the system. Historical local-only funding for both the City of Bismarck and City of Mandan were provided for the years 2009 through 2014¹⁷, and are illustrated in **Figure 8-1**. The average annual local-only project spending between 2009 and 2014 was:

- Bismarck: \$9,728,776
- Mandan: \$7,111,689

Local sources of funding include sales tax, assessment districts, general fund, gas tax, and property taxes.

¹⁷ Local-only funded transportation project data are not available from Lincoln, Burleigh County, or Morton County.

Figure 8-1. Local Spending on Transportation Projects, Bismarck and Mandan, 2009 to 2014.

Source: City of Mandan Finance Department, City of Bismarck Finance Department.

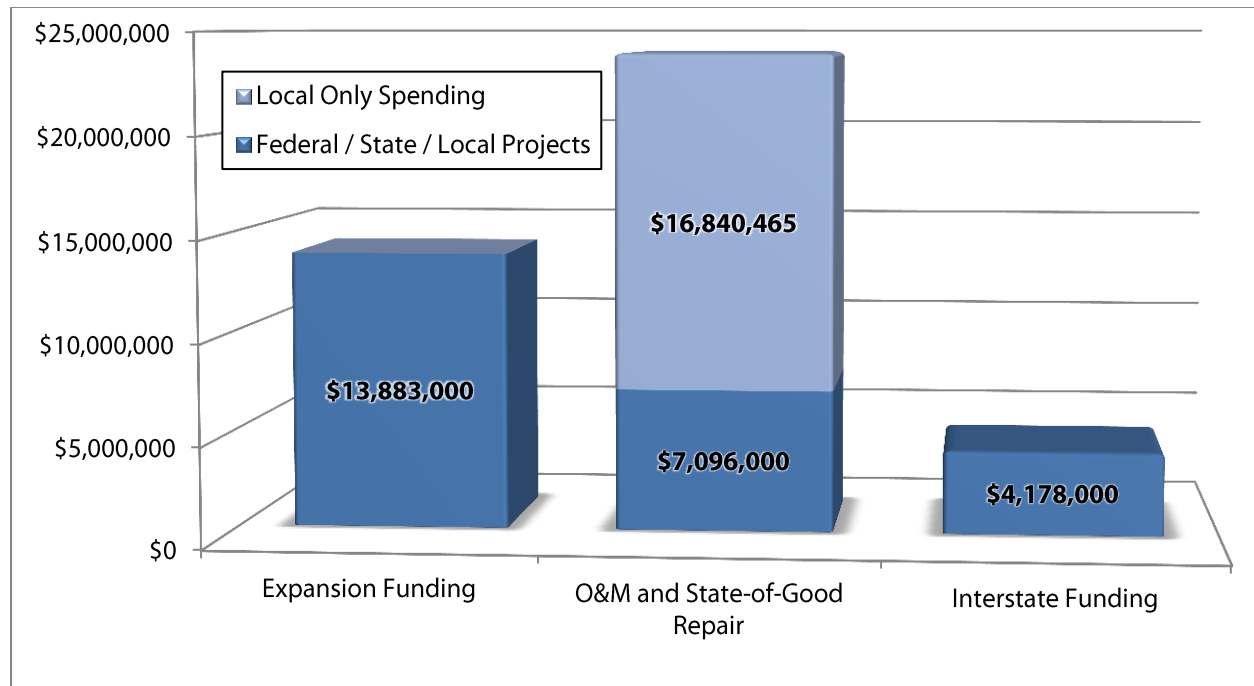
8.2.3 BASELINE ROADWAY AND BICYCLE / PEDESTRIAN FUNDING LEVELS

To forecast transportation funding needs into the future, the level of spending on projects in each TIP between 2007 and 2014 were classified into two project types: **system expansion** and **system preservation**.

- **Expansion projects:** These projects include expanding the multimodal system to address current deficiencies and/or future growth in the region through new corridors, new programs, widening of existing corridors, new turn lanes, widened bridges, improved intersection treatments, intelligent transportation systems (ITS) applications, etc.
- **Preservation projects:** These projects support existing infrastructure in the form of rehabilitation or resurfacing. One of the important performance goals of MAP-21 is to maintain the current federal system in a state of good repair. To help meet this performance goal, the 2040 LRTP assumes that continually higher levels of funding are needed for preserving the current system through Operations and Maintenance (O&M) and State-of-Good Repair projects. This reflects the findings of the *State of the Streets* reports on roadway condition for Bismarck and Mandan.

Interstate funds are a separate funding type that were not included in this analysis of expansion and preservation funding. This funding source is dedicated to only Interstate system projects, and historical trends for this funding source were not necessarily indicative of how the funds would be spent in the future. For this reason, Interstate funds are shown only as total annual funding. Based on the evaluations of the 2007 – 2014 TIPs, **Figure 8-2** shows the annualized breakdown of preservation, expansion and interstate project funds.

Figure 8-2. Current Annual Roadway Spending by Expansion, Preservation, and Interstate (in 2014 dollars)



Sources: Transportation Improvement Programs, 2007-2014, Bismarck-Mandan MPO, City of Mandan Finance Department, City of Bismarck Finance Department.

The majority of recent **bicycle and pedestrian project** spending has been on expansion projects. Between 2007 and 2014, the average annual funding for bicycle and pedestrian projects was:

- \$65,000, or 4% on preservation projects
- \$1,497,000, or 96% on expansion projects

8.2.4 EXISTING TRANSIT FUNDING

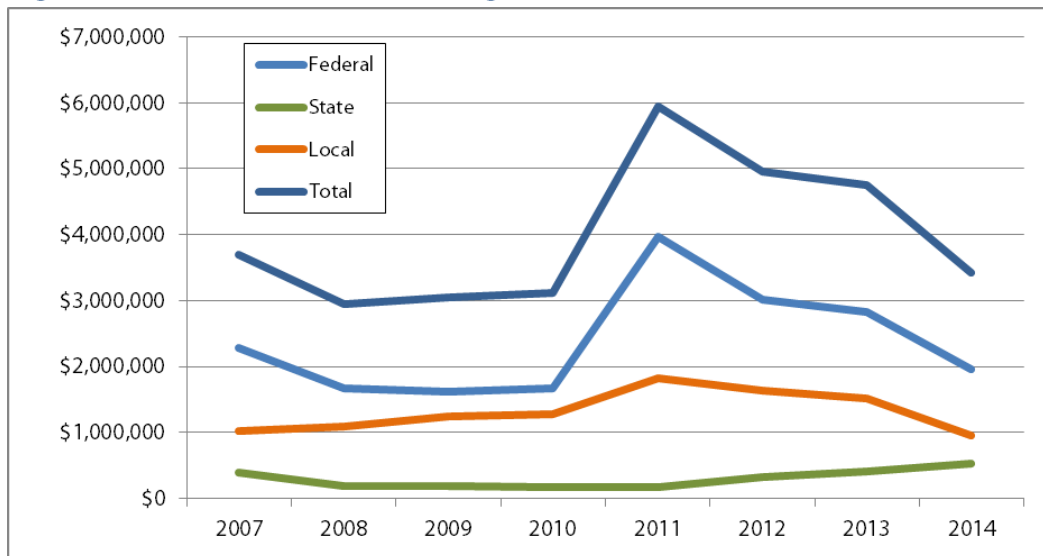
Transit funding in the Bismarck-Mandan region has been received from several sources in recent years:

- **FTA Urbanized Area Formula 5307:** funds for urbanized areas with a population over 50,000, and provides transit capital, operating assistance, and transportation planning.
- **FTA Capital Program Formula 5309:** funds for upgrading of bus system capital, including fleet, equipment, and buildings.
- **FTA Transportation for Elderly Persons and Persons with Disabilities Formula 5310:** funds for assisting private nonprofit groups provide transportation for the elderly and persons with disabilities.
- **FTA Transportation 5339:** funds for replacing, rehabilitating, and purchasing buses and transit equipment and to construct bus-related facilities.
- **FTA JARC and New Freedom funds (discontinued under MAP-21):** funds previously used to provide mobility / access to jobs for low income and disabled populations.

- **State Aid Funds:** funds determined by the state legislature for formula distribution.
- **Local Property Tax:** funds received from Bismarck and Mandan residents paying a mill levy on their properties.
- **Fare Revenues:** fares collected from CAT fixed route and Bis-Man paratransit riders
- **Other Transportation Revenues:** additional revenues earned by the Bis-Man Transit Board for their operations for activities such as advertising and building rent received.

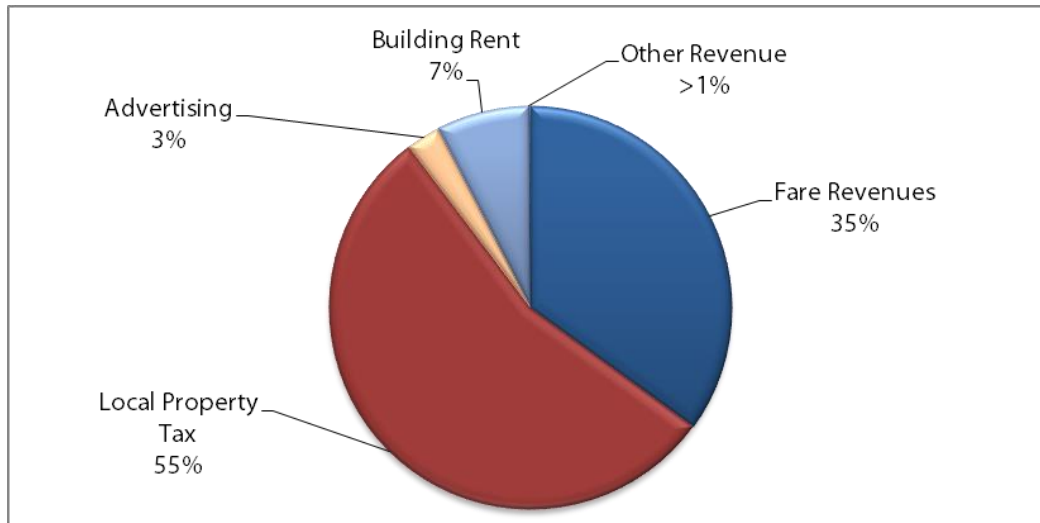
Transit funding comes from multiple funding sources. Historical funding levels by funding source (Federal, State, and Local) are documented in **Figure 8-3**. As shown, Federal spending on transit projects spiked between 2011 and 2013, and have returned to levels similar to the 2007 to 2010 period. The current 2014 to 2017 TIP anticipates that funding for transit in Bismarck-Mandan will remain relatively steady between 2015 and 2017, with total funding increasing from \$3.42 million in 2014 to \$3.71 million in 2017.

Figure 8-3. Annual Transit Funding Source Breakdown (in 2014 Dollars)



Source: Transportation Improvement Programs, 2007-2014, Bismarck-Mandan MPO.

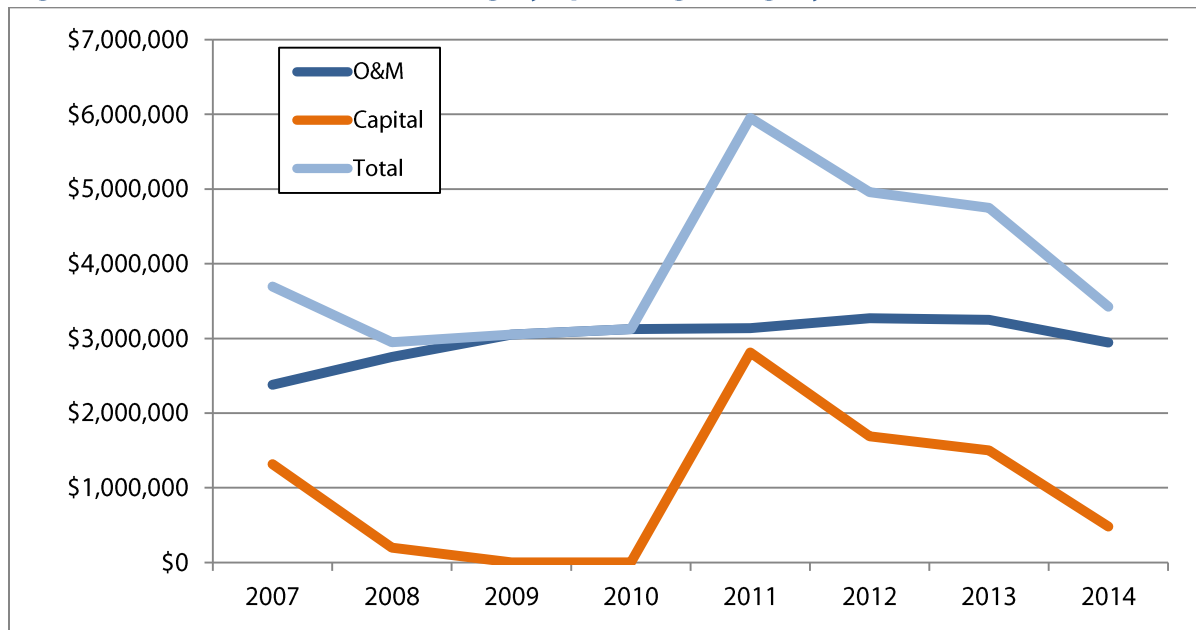
Figure 8-4 illustrates the breakdown of local funding sources.

Figure 8-4. Breakdown of Local Funding Sources for Transit, 2012

Source: National Transit Database, Federal Transit Administration, 2012.

Federal transit funding programs have changed over the 2007 to 2014 analysis period used. For instance, MAP-21 did not continue the Job Access and Reverse Commute (JARC) (Formula 5316) and New Freedom (Formula 5317) programs, which contributed significant transit funds in earlier TIPs. For consistency across the analysis period, **Figure 8-5** provides a summary of Federal Transit Funds by funding type, whether Operations and Maintenance (O&M) or for Capital expenditures. In 2014 dollars, 2007 to 2014 spending on each category has averaged:

- **Operations and Maintenance** accounted for \$2,988,550 annually (75% of the spending).
- **Capital expenditures** accounted for \$999,525 annually (25% of spending).

Figure 8-5. Annual Transit Funding by Spending Category (in 2014 Dollars)

Source: Transportation Improvement Programs, 2007-2014, Bismarck-Mandan MPO.

8.3 ROADWAY AND BICYCLE / PEDESTRIAN REVENUE PROJECTIONS

Based on the detailed historical spending breakdowns evaluated for the 2040 LRTP, and funding assumptions provided by NDDOT staff, forecasts of anticipated future funding levels were developed. The estimation of future annual transportation funding availability includes the following assumptions:

- **Project costs** will increase 4% annually.
- **Federal Aid Revenue** will increase 1.5% annually.
- **Preservation project needs** (O&M and State-of-Good Repair) will increase 4% annually.

With the assumptions documented above, **Figure 8-6** illustrates the anticipated investment levels by 2040. The funding forecasts that spending on O&M and state-of-good repair projects on the system will increase from 64% of all non-interstate roadway spending (local and federal-aid) in 2014 to 80% of all non-interstate roadway spending in 2040.

Figure 8-6. Year 2040 Annual Roadway Spending by Expansion, Preservation, and Interstate

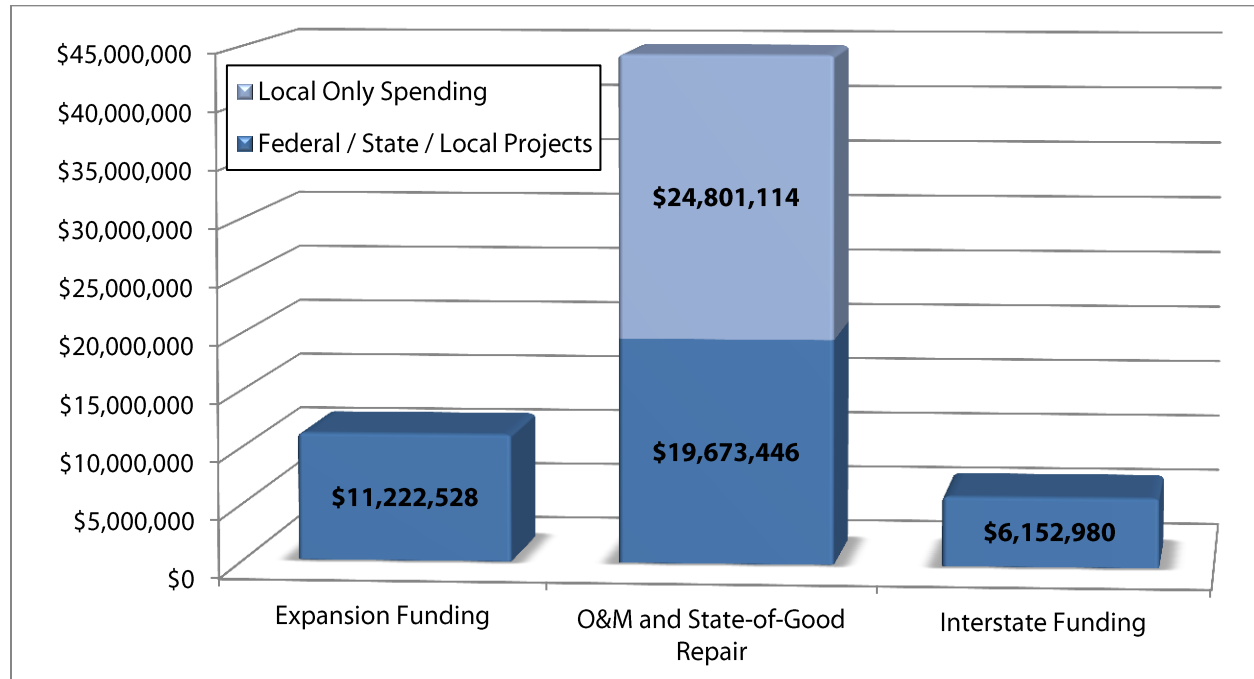


Figure 8-7 illustrates how annual roadway funding expenditures on both preservation and expansion projects are expected to change through 2040.

Figure 8-7. Projections of Future Roadway Preservation Spending and Expansion and Interstate Funding Trends

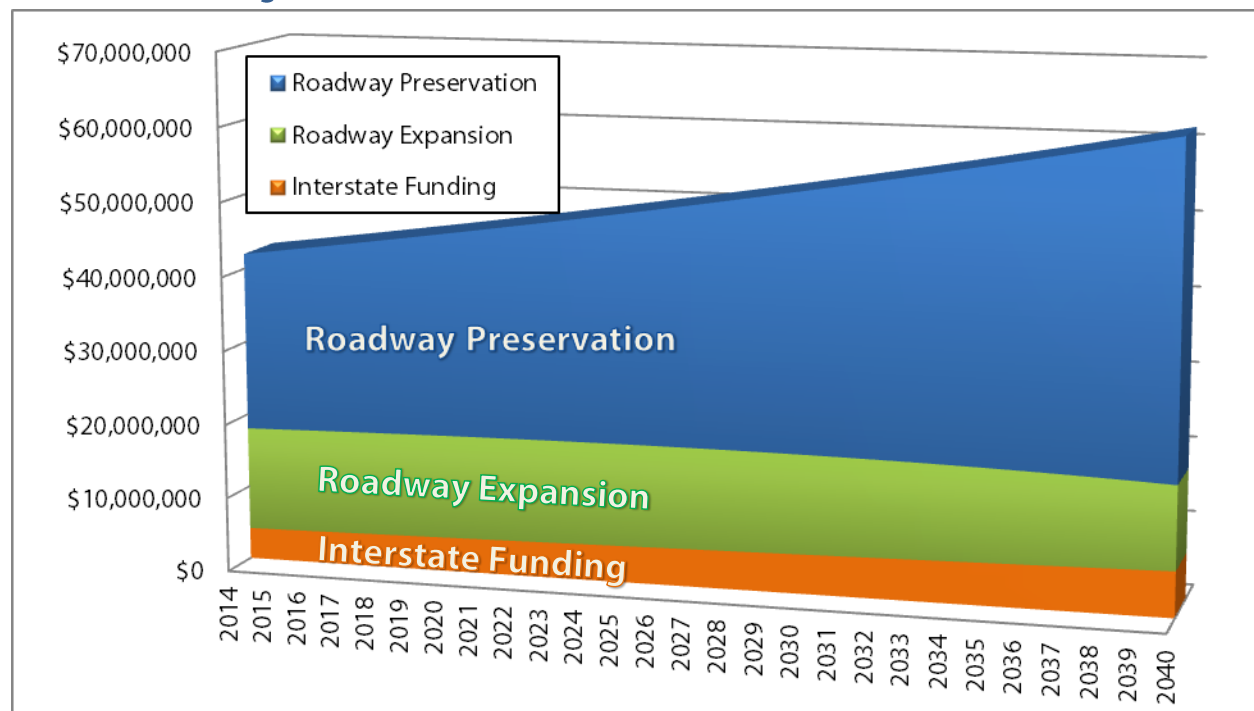


Figure 8-7 reflects a trend of increasing needs for system preservation. As the funding programs at the National level have merged, **Table 8-2** provides future forecasted roadway expansion funding into categories appropriate for long-term fiscal constraint evaluation. Expansion funds were forecasted after the anticipated needs for O&M and state-of-good repair funding were accounted for.

Table 8-2. Annual Forecasted Roadway Expansion Funding by Category

Year	STP Urban / Regional / Rural Projects	Other Roadway Projects ^a	Total Expansion Funds Available
2015	\$8,663,738	\$5,250,107	\$13,913,845
2016	\$8,678,814	\$5,259,243	\$13,938,057
2017	\$8,689,521	\$5,265,731	\$13,955,252
2018	\$8,695,609	\$5,269,421	\$13,965,030
2019	\$8,696,819	\$5,270,154	\$13,966,972
2020	\$8,692,877	\$5,267,765	\$13,960,642
2021	\$8,683,501	\$5,262,083	\$13,945,585
2022	\$8,668,394	\$5,252,928	\$13,921,322
2023	\$8,647,245	\$5,240,113	\$13,887,358
2024	\$8,619,732	\$5,223,440	\$13,843,173
2025	\$8,585,518	\$5,202,707	\$13,788,225
2026	\$8,544,250	\$5,177,699	\$13,721,949
2027	\$8,495,561	\$5,148,194	\$13,643,755
2028	\$8,439,067	\$5,113,960	\$13,553,027
2029	\$8,374,370	\$5,074,754	\$13,449,123
2030	\$8,301,050	\$5,030,323	\$13,331,373
2031	\$8,218,673	\$4,980,404	\$13,199,077
2032	\$8,126,785	\$4,924,721	\$13,051,505
2033	\$8,024,911	\$4,862,987	\$12,887,898
2034	\$7,912,559	\$4,794,903	\$12,707,461
2035	\$7,789,212	\$4,720,156	\$12,509,368
2036	\$7,654,333	\$4,638,422	\$12,292,755
2037	\$7,507,363	\$4,549,360	\$12,056,723
2038	\$7,347,717	\$4,452,616	\$11,800,333
2039	\$7,174,786	\$4,347,822	\$11,522,608
2040	\$6,987,935	\$4,234,593	\$11,222,528
2015-2040 Total	\$222,864,869	\$135,053,074	\$344,034,943

Notes: a – Includes Bridge, Safety, ITS.

Table 8-3 provides future forecasted annual roadway state-of-good repair and O&M funding levels for Federal / State / Local (Federal aid) projects, and those projects that are local-only funded projects.

Table 8-3. Annual Forecasted Roadway Preservation Funding

Year	Federal / State / Local (Federal Aid) Projects	Local-Only Projects	Total Preservation Funds Available
2015	\$7,379,840	\$17,093,072	\$24,472,912
2016	\$7,675,034	\$17,349,469	\$25,024,502
2017	\$7,982,035	\$17,609,711	\$25,591,745
2018	\$8,301,316	\$17,873,856	\$26,175,173
2019	\$8,633,369	\$18,141,964	\$26,775,333
2020	\$8,978,704	\$18,414,094	\$27,392,797
2021	\$9,337,852	\$18,690,305	\$28,028,157
2022	\$9,711,366	\$18,970,659	\$28,682,025
2023	\$10,099,821	\$19,255,219	\$29,355,040
2024	\$10,503,813	\$19,544,048	\$30,047,861
2025	\$10,923,966	\$19,837,208	\$30,761,174
2026	\$11,360,925	\$20,134,767	\$31,495,691
2027	\$11,815,362	\$20,436,788	\$32,252,150
2028	\$12,287,976	\$20,743,340	\$33,031,316
2029	\$12,779,495	\$21,054,490	\$33,833,985
2030	\$13,290,675	\$21,370,307	\$34,660,982
2031	\$13,822,302	\$21,690,862	\$35,513,164
2032	\$14,375,194	\$22,016,225	\$36,391,419
2033	\$14,950,202	\$22,346,468	\$37,296,670
2034	\$15,548,210	\$22,681,665	\$38,229,875
2035	\$16,170,138	\$23,021,890	\$39,192,028
2036	\$16,816,944	\$23,367,219	\$40,184,162
2037	\$17,489,621	\$23,717,727	\$41,207,348
2038	\$18,189,206	\$24,073,493	\$42,262,699
2039	\$18,916,775	\$24,434,595	\$43,351,370
2040	\$19,673,446	\$24,801,114	\$44,474,560
2015-2040 Total	\$327,013,585	\$538,670,554	\$865,684,139

Interstate funds (now part of the National Highway Performance Program under MAP-21) were accounted for separately than other roadway funding sources. Prior to MAP-21, these funds were from a separate funding program. Annual interstate funding forecasts, for both preservation and expansion, based on historical levels of regional funding are shown in **Table 8-4**.

Table 8-4. Annual Forecasted Interstate System Funding

Year	Interstate Funds
2015	\$4,240,670
2016	\$4,304,280
2017	\$4,368,844
2018	\$4,434,377
2019	\$4,500,893
2020	\$4,568,406
2021	\$4,636,932
2022	\$4,706,486
2023	\$4,777,083
2024	\$4,848,740
2025	\$4,921,471
2026	\$4,995,293
2027	\$5,070,222
2028	\$5,146,275
2029	\$5,223,470
2030	\$5,301,822
2031	\$5,381,349
2032	\$5,462,069
2033	\$5,544,000
2034	\$5,627,160
2035	\$5,711,568
2036	\$5,797,241
2037	\$5,884,200
2038	\$5,972,463
2039	\$6,062,050
2040	\$6,152,980
2015-2040 Total	\$133,640,343

The Bismarck-Mandan trail system is a relatively new system and historical TIPs have not reflected a strong need for preservation of the trail system. Thus, historical trends indicate that nearly all bicycle and pedestrian system spending is “expansion” spending. This is not a reasonable assumption as the bicycle and pedestrian system matures during the 2040 planning horizon. Thus, the financial analysis of bicycle and pedestrian modal funding provided in **Table 8-5** assumes that preservation requirements will grow to be a more sizable portion of total budgets by 2040.

Table 8-5. Annual Forecasted Bicycle and Pedestrian System Expansion and Preservation Funding

Year	Annual Bike and Pedestrian Preservation Costs	Annual Bike and Pedestrian Expansion Funding
2015	\$71,140	\$1,306,215
2016	\$77,860	\$1,320,155
2017	\$85,215	\$1,333,771
2018	\$93,265	\$1,347,005
2019	\$102,075	\$1,359,799
2020	\$111,718	\$1,372,085
2021	\$122,272	\$1,383,788
2022	\$133,823	\$1,394,827
2023	\$146,465	\$1,405,115
2024	\$160,301	\$1,414,553
2025	\$175,444	\$1,423,033
2026	\$192,018	\$1,430,436
2027	\$210,157	\$1,436,634
2028	\$230,010	\$1,441,483
2029	\$251,738	\$1,444,827
2030	\$275,519	\$1,446,494
2031	\$301,546	\$1,446,298
2032	\$330,032	\$1,444,029
2033	\$361,209	\$1,439,463
2034	\$395,331	\$1,432,351
2035	\$432,676	\$1,422,421
2036	\$473,549	\$1,409,375
2037	\$518,283	\$1,392,885
2038	\$567,243	\$1,372,592
2039	\$620,828	\$1,348,105
2040	\$679,475	\$1,318,992
2015-2040 Totals	\$7,119,192	\$36,286,731

The forecasts were compared to the current TIP to determine the **available expansion funding through 2040** for non-interstate expansion, bicycle and pedestrian expansion, and total interstate funds:

- **Non-interstate roadway expansion funds through 2040:** \$332,800,000. Generally, the breakdown is expected to be:
 - \$205,530,000 in Urban / Regional / Rural expansion funds.
 - \$127,800,000 in other roadway expansion funds (safety, bridge, ITS, etc.).
- **Interstate total funds through 2040:** \$123,000,000
- **Bicycle and pedestrian expansion funds through 2040:** \$35,700,000

8.4 TRANSIT REVENUE PROJECTIONS

Transit revenue projections were based on the latest funding information available in the 2015-2018 TIP.

Table 8-6 documents the transit system funding forecasts through 2040. As shown, **transit funds available** through 2040 (not including 2015-2018 funds used for operations and capital through the current TIP) are \$118,140,000.

Table 8-6. Annual Transit System Funding

Year	Funding by Level of Government			Total
	Federal	State	Local	
2015	\$3,610,659	\$150,000	\$1,798,573	\$5,559,232
2016	\$2,716,608	\$150,000	\$1,637,985	\$4,504,593
2017	\$2,716,608	\$150,000	\$1,637,985	\$4,504,593
2018	\$2,716,608	\$150,000	\$1,637,985	\$4,504,593
2019	\$2,757,400	\$152,300	\$1,662,600	\$4,572,300
2020	\$2,798,800	\$154,600	\$1,687,500	\$4,640,900
2021	\$2,840,800	\$156,900	\$1,712,800	\$4,710,500
2022	\$2,883,400	\$159,300	\$1,738,500	\$4,781,200
2023	\$2,926,700	\$161,700	\$1,764,600	\$4,853,000
2024	\$2,970,600	\$164,100	\$1,791,100	\$4,925,800
2025	\$3,015,200	\$166,600	\$1,818,000	\$4,999,800
2026	\$3,060,400	\$169,100	\$1,845,300	\$5,074,800
2027	\$3,106,300	\$171,600	\$1,873,000	\$5,150,900
2028	\$3,152,900	\$174,200	\$1,901,100	\$5,228,200
2029	\$3,200,200	\$176,800	\$1,929,600	\$5,306,600
2030	\$3,248,200	\$179,500	\$1,958,500	\$5,386,200
2031	\$3,296,900	\$182,200	\$1,987,900	\$5,467,000
2032	\$3,346,400	\$184,900	\$2,017,700	\$5,549,000
2033	\$3,396,600	\$187,700	\$2,048,000	\$5,632,300
2034	\$3,447,500	\$190,500	\$2,078,700	\$5,716,700
2035	\$3,499,200	\$193,400	\$2,109,900	\$5,802,500
2036	\$3,551,700	\$196,300	\$2,141,500	\$5,889,500
2037	\$3,605,000	\$199,200	\$2,173,600	\$5,977,800
2038	\$3,659,100	\$202,200	\$2,206,200	\$6,067,500
2039	\$3,714,000	\$205,200	\$2,239,300	\$6,158,500
2040	\$3,769,700	\$208,300	\$2,272,900	\$6,250,900
2015-2040	\$83,007,483	\$4,536,600	\$49,670,828	\$137,214,911

Source: Bismarck-Mandan MPO Final Draft 2015-2018 TIP

Chapter 9 FISCALLY CONSTRAINED PLAN

The 2040 LRTP has identified more system needs than expected future resources available. Many of the alternatives identified in *Chapter 7* are desirable from a system performance perspective, but will not fit within the fiscally-constrained plan. This chapter provides a summary of the fiscally-constrained 2040 LRTP project list.

The performance scoring process established to evaluate projects (as described in *Chapter 7*) was not the only criterion for project selection and inclusion in the 2040 LRTP. In general, the highest scoring projects were prioritized highest for inclusion in the fiscally-constrained plan. Alternatives were selected based on several factors, including:

- Degree to which candidate projects were complementary with other projects in creating comprehensive set of transportation system improvements.
- Feedback received from the public and stakeholders when the alternatives were presented to the public.
- Level of performance benefits consistent with MAP-21 direction and our 2040 LRTP performance measure scoring.
- Degree to which candidate projects were implementable from a public support and project development perspective.

The fiscally-constrained 2040 LRTP plan elements include:

Street and Highway system improvements intended to address system performance needs from the perspectives of mobility / congestion reduction, safety, and connectivity.

Signal system improvements across the region, including technology / Intelligent Transportation System (ITS) upgrades for the Bismarck signal system to improve system efficiency.

Bicycle and pedestrian system improvements that address system connectivity and safety needs. These include on-street and trail system improvements to complete system connections.

Transit system changes that emphasize more efficient bus routes and maintaining the current paratransit service, while shifting able-bodied riders to the fixed route system.

A funding plan that addresses the increasing **operations and maintenance and state-of-good-repair needs** for the multimodal system.

Roadway, transit, and bicycle and pedestrian projects included in the current **Transportation Improvement Program (TIP)**.

Additional programs and initiatives, including **travel demand management programs and complete streets** that address the travel demand in the region, in attempt to get more out of the current and future transportation system.

A list of **recommended regional and corridor studies** of areas and issues that require more detailed evaluation than what is possible within the context of the 2040 LRTP.

9.1 2015-2040 MULTIMODAL ELEMENTS OF THE FISCALLY-CONSTRAINED PLAN

The 2040 LRTP includes multimodal projects placed in the following anticipated implementation phases:

- Current 2015-2018 TIP projects
- Short-Term Projects (2015 through 2023)
- Mid-Term Projects (2024-2032)
- Long-Term Projects (2033-2040)

The fiscally-constrained 2040 LRTP is presented by mode in this section. The modal elements are illustrated in the following figures:

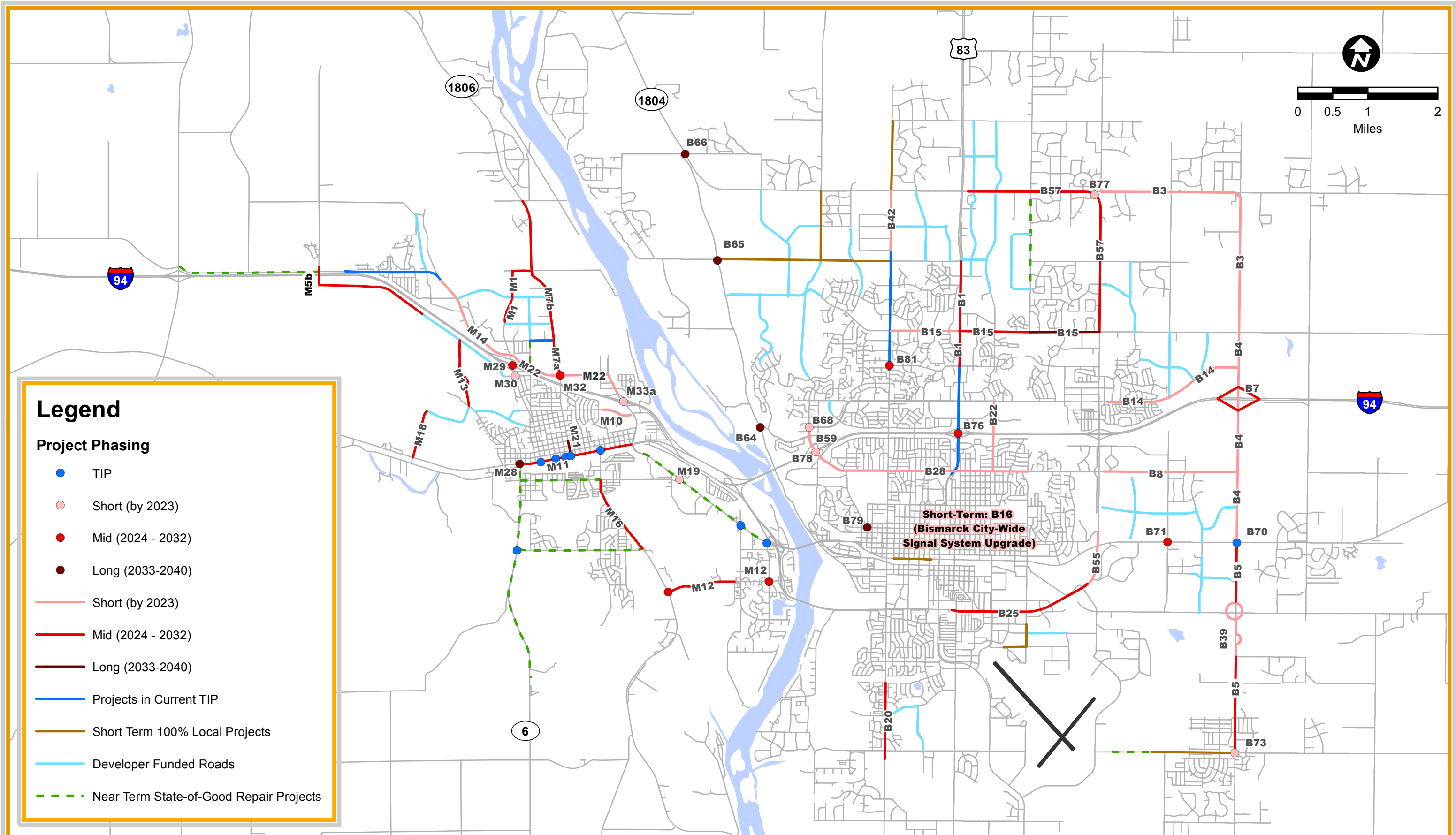
- **Figure 9-1** shows the **roadway plan**. The roadway plan also includes roadways that are considered **developer-funded** collector roads based on input from the Fringe Area Roadway Plan and from jurisdiction staff. Additionally, the roadway plan includes roadways that are anticipated to be **locally-funded** roadway projects within the short-term period; these locally-funded projects are listed in this section. Near-Term **state-of-good-repair** / preservation projects are also shown. The developer- and locally-funded roadways are not included in the Federal-Aid element of the LRTP.
- **Figure 9-2** shows the **bicycle and pedestrian plan**. Current trails, trail projects in the current TIP, and current on-street bike and pedestrian system are shown for reference. Illustrative trails, those considered important connections but not included in the fiscally-constrained plan, are also shown.
- **Figure 9-3** shows the **transit plan** for the CAT bus route adjustments.

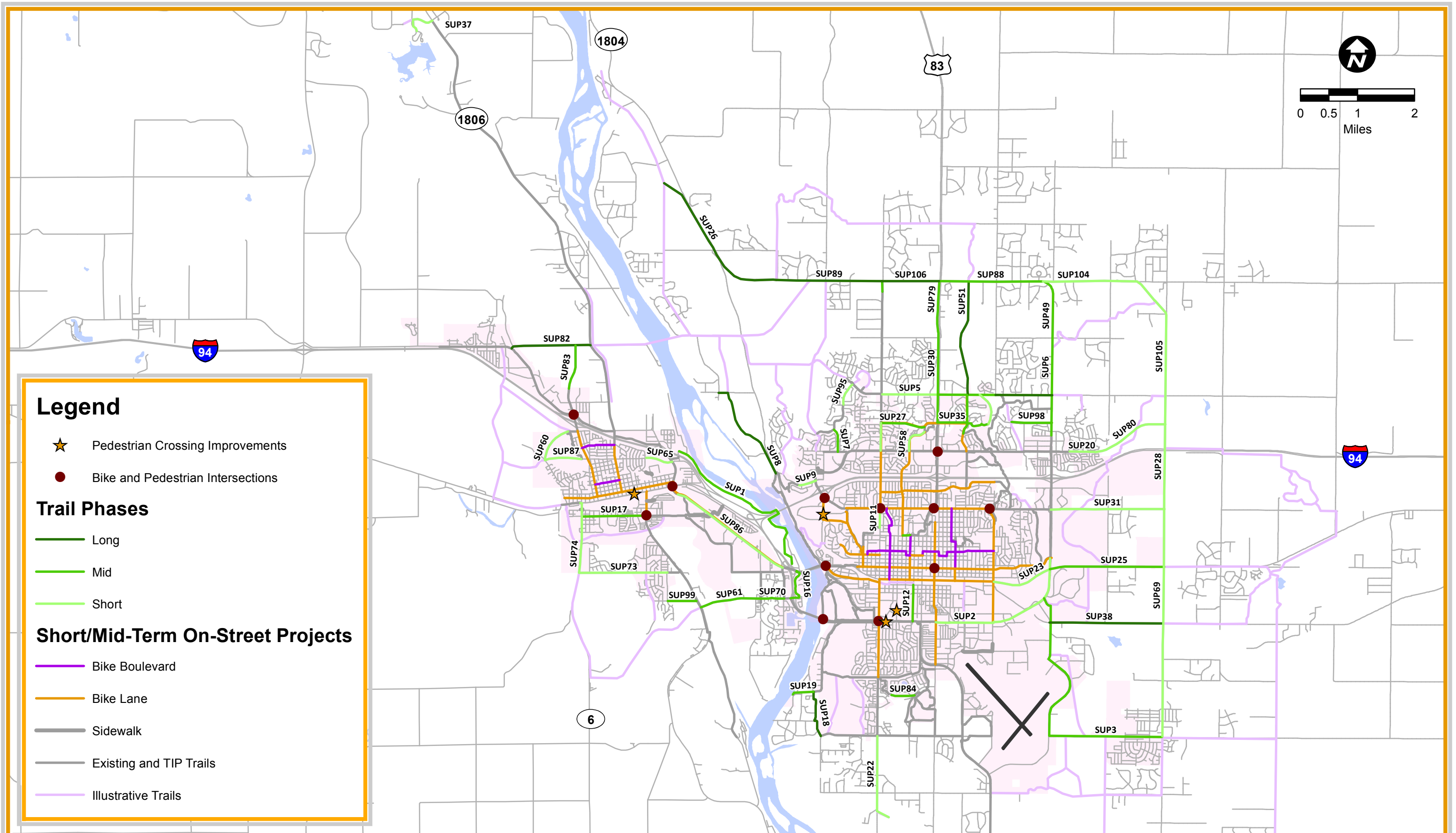
9.1.1 2015-2018 TRANSPORTATION IMPROVEMENT PROGRAM

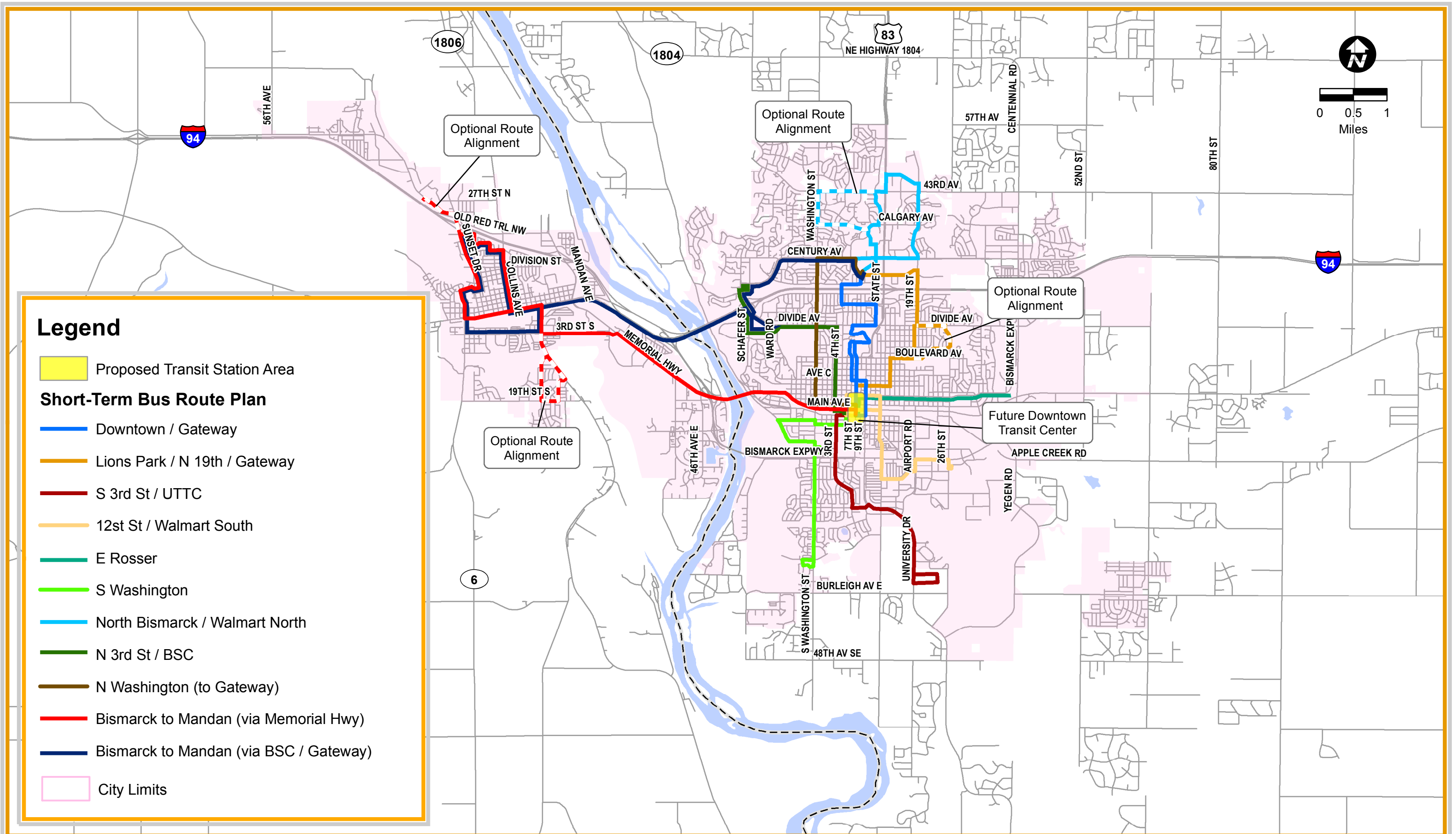
The 2015-2018 Bismarck-Mandan MPO TIP includes several projects which will be implemented in between the years 2015 and 2018, and are included in the fiscally-constrained plan. Expansion projects including roadway widening, new turn lanes, or traffic signal improvements in the current TIP include:

- Reconstruct / widen Washington Street between Calgary Avenue and 57th Avenue (Bismarck).
- Traffic signal improvements to Bismarck Expressway and University Drive (Bismarck).
- Turn lane additions along State Street / US 83 between Divide Ave and Calgary Ave (Bismarck).
- Traffic signal improvements to Memorial Highway / 40th Avenue SE, Memorial Highway / 46th Avenue SE, and Main Street / Twin City Drive (Mandan).
- Reconstruct / widen Old Red Trail to 3-lanes between Highland Rd and 47th Avenue NW (Mandan).
- Intersection improvement (signal and turn lanes or a roundabout) at 66th Street / Highway 10 (Burleigh County).
- Turn lane and safety improvements at Highway 6 / 19th Street SW (Mandan).
- Traffic signal improvements along Main Street between Highway 6 and Highway 1806 (Mandan).

Reconstruction / new turn lane on 27th Street between Highway 1806 and 8th Avenue NW (Mandan).







The bicycle and pedestrian projects included in the current TIP are:

- Edgewood Trail between the existing trail and Legacy High School (Bismarck).
- North side of Lincoln Rd between Benteen Drive and McDougal Drive (Lincoln).

The transit projects included in the current TIP are maintenance, operations and maintenance costs, planning costs, and operating and capital grants.

9.1.2 ROADWAY PROJECTS

Short-Term Plan (2015 through 2023)

The short-term plan elements are those that are considered to be most critical to current mobility and safety needs in the region. The short-term plan includes a period that extends 5-years beyond the end of the current TIP, through the year 2023. To estimate **year-of-expenditure costs**, consistent with the requirements of LRTPs, costs shown for the short-term are grown at 4% per year to **2021 dollars**, the mid-point of the period 2019-2023.

The roadway projects included in the short-term plan are documented in **Table 9-1**. Not including projects currently programmed in the 2015-2018 TIP, the total roadway costs in the short-term are **\$106,320,000** in year-of-expenditure costs for roadway expansion projects¹⁸.

The *Memorial Highway reconstruction between Main Street and I-194/Bismarck Expressway* is anticipated in the short-term as a preservation / state-of-good repair project. While the LRTP has accounted for increasing levels of preservation costs through the planning horizon to address reconstruction needs, this project is an exception as it is relatively near-term and a high-cost project compared to historical Federal-aid system preservation projects. It was assumed that a portion of funds historically used for expansion would be required to divert to state-of-good repair element to pay for this short-term project (estimated at \$25,000,000 in preservation costs in year-of-expenditure dollars¹⁹). Beyond those funds already assumed for Federal-aid preservation projects (as documented previously in **Table 8-3**), it is anticipated that the additional roadway funds required from the expansion budget to pay for this preservation project are **\$7,600,000**. Thus, including this exceptional preservation project, total short-term expansion costs are expected to be **\$113,920,000**.

¹⁸ Note that additional flexibility is assumed in future allocation of Interstate projects, as the new National Highway Performance Program brings together what were separate funding programs before MAP-21 (National Highway System (NHS) routes, the Highway Bridge Program, and the Interstate Maintenance program). For the purposes of the LRTP, Interstate interchange projects are assumed to use both interstate funding and non-interstate funding (Urban, Regional and Other) expansion sources.

¹⁹ *Mandan Memorial Highway Corridor Study*, December 2010. Not including transportation enhancement and traffic signal elements, which are accounted for in the LRTP expansion funds.

Table 9-1. Short-Term Roadway Projects

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
B3	71st Ave and 66th St, Centennial Rd to 43rd Ave: Construct in tandem with B4 as arterial / truck route. Grade for 5-lanes, but build as a 2-lane rural roadway with turn lanes. Restrict full access points to 1/2 mile. Include sidepath in project.	Congestion Reduction, Freight Flow, Safety Benefits to Adjacent Corridors	Urban / Regional / Rural and Other	\$7,400,000	\$9,370,000
B4	66th Street, Highway 10 / Main Ave to 43rd Ave with I-94 Crossing: Extend 66th St as arterial roadway between Highway 10 and 43rd Ave with I-94 crossing. Restrict full access points to 1/2 mile. Grade for 5-lanes, but build as a 2-lane rural roadway with turn lanes. Build I-94 bridge to accommodate 4-lanes. Include sidepath trail with project.	Connectivity, Congestion Reduction, Freight Flow, Safety Benefits to Adjacent Corridors	Urban / Regional / Rural and Other	\$8,850,000	\$11,200,000
B8a	Divide Ave, Expressway to 52nd St: Extend Divide as a 3-lane urban arterial from Expressway to 52nd Street; adjacent to future industrial and urban residential.	Connectivity, Freight Flow, Congestion Reduction.	Urban / Regional / Rural	\$7,900,000	\$10,000,000
B8b	Divide Ave, 52nd St to 66th St: Improve Divide as a 2-lane rural road with turn lanes from 52nd Street to 66th Street.	Connectivity, Freight Flow, Congestion Reduction.	Other	\$1,500,000	\$1,900,000
B14	Century Ave, Centennial Rd to 66th St: Reconstruct Centennial to 52 nd and build new road between 52nd to 66 th for a 3-Lane urban arterial. Reserve ROW for 5-lanes in future.	Connectivity, Congestion Reduction	Urban / Regional / Rural	\$9,500,000	\$12,000,000
B15a	43rd Ave, Washington St to State St: Widen 43rd Ave as 4-Lane Divided Urban Roadway between Washington St and State St, include sidepath trail.	Congestion Reduction, Safety	Urban / Regional / Rural	\$11,000,000	\$13,920,000
B16	Bismarck Signal System Upgrades: After traffic signal master plan and communications plan, Signal system upgrades in key urban corridors: Washington St, Bismarck Expwy, State St, Rosser St, 43rd Ave. Includes fiber optic connections, new signal cabinets, software, pan-tilt-zoom cameras (in some corridors).	Congestion Reduction, Safety	Other	\$4,000,000	\$5,060,000
B22a	19th St, Divide Ave to Century Ave: Restripe for 3-lanes through this section. Add northbound right-turn lane at Shiloh School.	Congestion Reduction, Safety	Other	\$500,000	\$630,000

Table 9-1. Short-Term Roadway Projects (Continued)

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
B28	Divide Ave: Turnpike Ave to 26th St: Restripe Divide as a 3-lane roadway between Turnpike and 26th Street. Evaluate on-street bike integration options; requires removal of on-street parking. Evaluate implementation plan in low-cost urban corridor study.	Congestion Reduction, Safety	Other	\$290,000	\$370,000
B39	66th Street at BNSF Railroad: Grade separate 66th Street from BNSF railroad. Construct 4-lane bridge for future needs. Realign 66th Street to construct Apple Creek / 66th Street roundabout.	Congestion Reduction, Freight Flow, Safety	Urban / Regional / Rural and Other	\$7,980,000	\$10,100,000
B42	Washington St, 57th Avenue to 71st Avenue / Highway 1804: Reconstruct Washington Street as a 3-lane urban arterial between 57th Avenue (where programmed 4-lane widening ends) to 71st Avenue / Highway 1804.	Congestion Reduction, Safety	Urban / Regional / Rural	\$3,440,000	\$4,350,000
B55	Bismarck Expressway, Yegen Rd to Main Ave: System management along Expressway, includes dual SB left-turn lanes at Hwy 10, acceleration lane from Yegen to Northbound Expressway, SB right-turn lane at Main Ave.	Freight Flow, Congestion Reduction, Safety	Other	\$800,000	\$1,010,000
B59	Tyler Parkway: Century Ave to Schafer St: Safety improvements on Tyler with turn lane additions and signal timing improvements. Recommend more study as part of Signal System Master Plan and Low-Cost Urban Streets Study.	Safety and Congestion Reduction	Other	\$600,000	\$760,000
B68	Century Ave / Tyler Pkwy Intersection: Signalize intersection of Century and Tyler Parkway. Likely warranted in near to mid-term.	Safety and Congestion Reduction	Other	\$400,000	\$510,000
B73	Lincoln Road / 66th St Intersection: LRTP assumes roundabout – analyze traffic movements to determine if roundabout or traffic signal / turn lanes are optimal.	Safety and Congestion Reduction	Other	\$800,000	\$1,010,000
B77	71st St / Centennial Rd Intersection: Improve geometry / improve advanced warning at Centennial Rd / 71st St intersection to address safety concerns.	Safety, Freight Flow	Other	\$450,000	\$570,000
B78	Tyler Parkway / Divide Ave I-94 Interchange: Ramp reconstructions and taper adjustments per I-94 corridor study to address safety and congestion issues.	Safety, Freight Flow, and Congestion Reduction	Interstate and Urban / Regional	\$2,500,000	\$3,160,000
M7a	Highway 1806 / Collins Ave, 27th St to Old Red Trail: add turn lanes along Highway 1806 and traffic signal at Old Red Trail / Highway 1806.	Safety, Congestion Reduction, Freight Flow	Other	\$400,000	\$510,000

Table 9-1. Short-Term Roadway Projects (Continued)

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
M10	Division St: 8th Ave E to Mandan Ave: Extend Division east to Mandan Ave as 2-lane minor arterial, future urban residential development adjacent to road.	Connectivity and Congestion Reduction	Urban / Regional / Rural	\$3,750,000	\$4,740,000
M14	Old Red Trail: Highland Rd to Sunset Ave: Restripe Old Red Trail with center turn lane for safety / mobility. Signal likely warranted at 37th Ave NW / Old Red Trail (cost included).	Safety and Congestion Reduction	Other	\$550,000	\$700,000
M19	3rd St / Memorial Hwy Intersection: Traffic signal when warranted. Project is expansion element of Memorial Highway reconstruction.	Safety, Congestion Reduction	Other	\$400,000	\$510,000
M22	Old Red Trail: Sunset Ave to Mandan Ave Interchange: Reconstruct Old Red Trail as a 2-lane urban with turn lanes between Collins Ave and Mandan Ave. Restripe for 3-lanes between Sunset and Collins. Add NB truck lane for Tesoro entrance, improve eastbound radius at Old Red Trail / Mandan Avenue curve by Tesoro. Widen turn radii and add turn lanes at Collins.	Safety, Freight Flow, and Congestion Reduction	Urban / Regional / Rural	\$4,880,000	\$6,170,000
M30	Boundary Rd / Sunset Dr Intersection: Signalize and stripe turn lanes on all approaches at Sunset / Boundary Rd. Coordinate with new I-94 interchange signals. Minor reconstruction to improve drainage on west side of Sunset.	Congestion Reduction, Safety, Freight Flow	Other	\$520,000	\$660,000
M33a	Mandan Ave Interchange with I-94: Short-term project to reconstruct ramps to reduce skew, add signals at ramp terminals, and restripe taper.	Safety, Freight Flow	Interstate and Urban / Regional	\$820,000	\$1,040,000

Mid-Term Plan (2024 through 2032)

The mid-term plan elements are those that are higher-priority projects and address some of the many mobility, safety, and freight needs that remain during the forecasted high growth period to occur through 2025. To estimate **year-of-expenditure costs**, consistent with the requirements of LRTPs, costs shown for the mid-term are grown at 4% per year to **2028 dollars**, the mid-point of the period 2024-2032.

The roadway projects included in the mid-term plan are documented in **Table 9-2**. The total roadway costs in the mid-term are **\$234,040,000** in year-of-expenditure costs for roadway expansion projects.

Table 9-2. Mid-Term Roadway Projects

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
B1b	State Street, 43rd Ave to 57th Ave: Widen and reconstruct State St to 6 lanes 43rd to 57th. Freeway concept discarded due to access impacts.	Congestion Reduction, Freight Flow, Safety	Urban / Regional / Rural	\$11,000,000	\$18,320,000
B1c	State St, Calgary Ave to 43rd Ave: Widen and reconstruct State St to 6 lanes Calgary to 43rd Avenue.	Congestion Reduction, Freight Flow, Safety	Urban / Regional / Rural	\$5,500,000	\$9,160,000
B5	66th St, Lincoln Rd to Highway 10 / Main Ave: Reconstruct 66th St as a rural 2-lane road with turn lanes and shoulders between Lincoln Rd and Hwy 10. Restrict full access points to 1/2 mile. Reserve right-of-way for 5-lanes. Include trail with 3-lane widening.	Congestion Reduction, Safety, Freight Flow	Urban / Regional / Rural	\$10,545,000	\$17,560,000
B7	Interstate 94 @ 66th St: New I-94 Interchange at 66th St.	Connectivity, Freight Flow, Congestion Reduction	Urban / Regional / Rural and Other	\$13,950,000	\$23,230,000
B15b	43rd Ave, State St to 26th St: Widen 43rd Ave as 4-Lane Divided Urban Roadway between State St and 26 th St, include bike / pedestrian trail. Additional cost assumed for railroad crossing, cross-street access, and drainage.	Congestion Reduction, Safety	Urban / Regional / Rural and Other	\$14,000,000	\$23,320,000
B20	Washington St, Drainage Channel to Burleigh Ave: Reconstruct South Washington as a 3-lane urban arterial south of drainage channel (where current 4-lane section ends) to Burleigh Ave.	Congestion Reduction, Safety	Urban / Regional / Rural	\$6,000,000	\$10,000,000
B25	Bismarck Expressway, 12th St to Yegen Rd: 3/4 access control along Bismarck Expressway and widening at Airport Rd for right-turn lanes for freight access.	Freight Flow, Safety, Congestion Reduction	Other	\$1,500,000	\$2,500,000
B57	71st Ave and Centennial Rd, State St / US 83 to 43rd Ave: Widen 71st Ave / Centennial Rd to 3-lane roadway, improve access control similar to 71st and Centennial study. Grade separation with DMVW railroad. Sidepath trail adjacent to roadway.	Freight Flow, Safety, Congestion Reduction	Other	\$8,640,000	\$14,400,000
B71	Highway 10 / 52nd St Intersection: Install traffic signal. Will be warranted as adjacent development occurs. Alternative would be roundabout.	Safety, Congestion Reduction	Other	\$400,000	\$670,000

Table 9-2. Mid-Term Roadway Projects (continued)

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
B76	State St Interchange with I-94: Reconstruct and reconfigure State St / I-94 interchange to improve safety and flow per I-94 Corridor Study.	Freight flow, Safety, Congestion Reduction	Interstate and Urban / Regional / Rural	\$18,000,000	\$29,970,000
B81	Calgary Ave / Washington St Intersection: Install traffic signal when warranted.	Safety, Congestion Reduction	Other	\$400,000	\$670,000
M1	Sunset Dr, Middle School to 38th St: Extend Sunset as a 3-lane urban arterial through north Mandan growth area to 38th St. Some developer-funded extensions are assumed to occur in short term in tandem with development. This project will reconstruct those sections as standard urban 3-lane in mid-term. Reserve 100' right-of-way.	Connectivity, Congestion Reduction	Urban / Regional / Rural	\$5,625,000	\$9,370,000
M5b	56th Ave NW Crossing of I-94: Old Red Trail to Boundary Road: Extend 56th Ave south across I-94, to connect with extended Boundary Road. Project includes extension of Boundary Road for 1.5 miles from assumed developer-funded Boundary Road extension.	Connectivity, Freight Flow	Urban / Regional / Rural	\$9,558,000	\$15,910,000
M7b	Highway 1806 / Collins Ave, 37th St to Old Red Trail: Add turn lanes at key intersections: Beretta St, 39th St, 38th St, Sioux St and 37th St. Assume minor Highway 1806 realignment at 38th St to improve angle of intersection with future Sunset Ave extension.	Safety, Congestion Reduction, Freight Flow	Other	\$1,200,000	\$2,000,000
M11	Main St, 8th Ave W to 3rd Ave E: Targeted turn lane additions and limited on-street parking removals west of 2nd St NW. Potential conversion of cross-streets to one-way traffic operation. New traffic signal in the corridor. Implementation plan will come from future Mandan Downtown Corridor Study.	Safety, Congestion Reduction, Freight Flow	Other	\$420,000	\$700,000
M12	McKenzie Rd, 39th Ave E to Highway 1806: Extend McKenzie across Heart River to Hwy 1806 as rural 2-lane roadway with turn lanes (where needed). Reserve 100' right-of-way. New bridge across Heart River. Signalize intersection with Highway 1806. Add signals at McKenzie / Expressway interchange ramps and at McKenzie / 46th Ave. Include trail with new roadway.	Connectivity, Congestion Reduction, Freight Flow, Safety Benefits to Adjacent Corridors	Urban / Regional / Rural	\$7,700,000	\$12,820,000

Table 9-2. Mid-Term Roadway Projects (continued)

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
M13b	20th Ave West, Boundary Rd Extension to Lohstreter / Division Ave: 20th Ave West: Proposed Boundary Rd Extension to Lohstreter / Division Ave	Connectivity, Freight Flow	Urban / Regional / Rural	\$2,475,000	\$4,120,000
M16	Highway 1806 / 6th Ave E, 19th St SE to Main St: Add Hwy 1806 turn lanes and signals at 8th Ave and 19th St intersections. Improve pedestrian crossing at 3rd St intersection. Consider additional NB turn lane @ Main. Evaluate segment north of 8th Ave in low-cost urban street study.	Safety, Congestion Reduction, Freight Flow	Urban / Regional / Rural	\$1,060,000	\$1,760,000
M18	32nd Ave W, Boundary Road to I-94 Business Loop (Main St): West Mandan arterial connection / truck route for potential 32nd Ave W crossing of or interchange with I-94 to Old Red Trail.	Connectivity, Freight Flow	Urban / Regional / Rural and Other	\$6,250,000	\$10,410,000
M29	Sunset Drive Interchange at I-94: Reconstruct and reconfigure I-94 / Sunset interchange to reduce skew, improve capacity on Sunset under I-94.	Freight Flow, Safety, Congestion Reduction	Interstate and Other (NHPP)	\$19,200,000	\$31,970,000
M32	Old Red Trail / Collins Ave Intersection: Project adds turn lanes on all approaches through urban reconstruction and signalization. Near-term project is assumed (with City funds) to add turn lanes and a temporary signal (100% locally-funded as documented "Locally-Funded Roadway Projects" section in this Chapter).	Congestion Reduction, Safety, Freight Flow,	Other	\$2,310,000	\$3,850,000

Long-Term Plan (2033 through 2040)

The long-term plan elements are those projects that address some of the many remaining mobility, safety, and freight needs. As illustrated by the lower number of long-term roadway projects, it is anticipated that following significant investments in system connectivity and capacity that occur during the short-term and mid-term, the long-term will require a greater shift in emphasis to maintaining the system in a state-of-good repair. To estimate **year-of-expenditure costs**, consistent with the requirements of LRTPs, costs shown for the long-term are grown at 4% per year to the **average of 2036 and 2037 dollars**, the mid-point of the period 2033-2040.

The roadway projects included in the long-term plan are documented in **Table 9-3**. The total roadway costs in the mid-term are **\$36,250,000** in year-of-expenditure costs for roadway expansion projects.

Table 9-3. Long-Term Roadway Projects

ID	Project Description	Project Purpose	Likely Funding Sources	2015 Cost	Year of Expenditure Cost
B15c	43rd Ave, 26th St to Centennial Road: Widen 43rd Ave as 4-Lane Divided Urban Roadway between 26th St and Centennial road, include bike / pedestrian trail.	Congestion Reduction, Safety	Urban / Regional / Rural	\$11,000,000	\$25,560,000
B64	Burnt Boat / River Road Intersection: LRTP assumes roundabout at River Rd and Burnt Boat Dr – analyze traffic movements to determine if roundabout or traffic signal / turn lanes are optimal. Assume rural signal would include advanced warning / activated flashers.	Congestion Reduction, Safety	Other	\$800,000	\$1,860,000
B65	Burnt Creek Loop S (57th Ave) / River Road Intersection: LRTP assumes roundabout – analyze traffic movements to determine if roundabout or traffic signal / turn lanes are optimal. Assume rural signal would include advanced warning / activated flashers.	Safety, Congestion Reduction	Other	\$800,000	\$1,860,000
B66	Burnt Creek Loop North / River Road / Highway 1804 Intersections: LRTP assumes two off-set roundabouts or a design that brings together Burnt Creek, Highway 1804 and River Rd into 5-point roundabout.	Congestion Reduction, Safety	Other	\$1,600,000	\$3,720,000
B79	Avenue C / Ward Rd Intersection: Add turn lanes to SB Ward Rd and WB Ave C to address congestion. Alternate option: mini-urban roundabout.	Congestion Reduction, Safety	Other	\$400,000	\$930,000
M21	Collins Avenue, 2nd Street N to Main Street: As congestion warrants, stripe a southbound left-turn lane on Collins Ave at Main St. Signalize 1st St / Collins and 2nd St / Collins when warranted.	Congestion Reduction, Safety	Other	\$800,000	\$1,860,000
M28	10th Ave W (Highway 6) / Main Street Intersection: Turn lane and signal improvement at Highway 6 and Main St. Assumes eastbound right-turn lane. Limited options for northbound movement due to Highway 6 bridge.	Safety, Freight Flow, Congestion Reduction	Other	\$200,000	\$460,000

Short-Term State-of-Good-Repair Projects

Staff from Burleigh County, the City of Bismarck, and the City of Mandan identified several projects anticipated to be state-of-good-repair / preservation projects in the short-term. These projects are not included as part of the assumed expansion funding, with the exception of part of the Memorial Highway reconstruction project (as discussed in the “Short-Term Roadway Plan” section). The state-of-good-repair projects shown in **Figure 9-1** include:

- Memorial Highway between Main Street and I-194/Bismarck Expressway (Mandan)

- Reconstruction of Highway 6 / 10th Avenue SW (Mandan)
- Reconstruction of 3rd Street SW (Mandan)
- Reconstruction of 19th Street SW (Mandan)
- Reconstruction of 26th Street between Deadwood Drive and 71st Avenue (Bismarck)
- Reconstruction of Old Red Trail / County Road 139A between 56th Avenue NW and Highway 25 (Morton County)
- Reconstruction of Lincoln Road west of 52nd Street (Burleigh County)

Note that this is not an exhaustive list of state-of-good-repair projects for the short-term, just those noted by local staff.

Locally-Funded Roadway Projects

Staff from Burleigh County, the City of Bismarck, and the City of Mandan identified several projects anticipated to be constructed with City and / or County funds only in the short-term. These projects are not included in the Federal-Aid project list for the 2040 LRTP, but provide useful mobility, accessibility, and safety improvements that should be considered as a part of the overall plan. The locally-funded projects shown in **Figure 9-1** include:

- Add turn lanes and temporary traffic signal at the intersection of Collins Road and Old Red Trail in Mandan (mid-term Project M32 would reconstruct this intersection as an urban roadway with curb and gutter and provide a permanent traffic signal.)
- 57th Avenue extension between Washington Street and River Road.
- Lincoln Road reconstruction and turn lane additions between 52nd Street and 66th Street.
- Main Avenue conversion to 3-lane cross-section, with bike lanes between 1st Street and 6th Street, pedestrian and streetscape improvements per Downtown Bismarck Study.
- 15th St NW (Burleigh County) extension between 71st Avenue / Highway 1804 and 57th Avenue.
- Reconstruction / paving of Airway Avenue west of 26th Street and 26th Street between Wal-Mart entrance and Airway Avenue.

Roadway Expansion Plan Costs and Forecasted Funding

This section provides an overview of the roadway expansion plan costs in relation to the anticipated funding sources identified in *Chapter 8*. All costs and revenues are provided in year-of-expenditure dollars. The roadway needs are anticipated to be higher in the near-term and mid-term, as the MPO growth scenario described in *Chapter 4* assumes significantly heavier growth for the 2015-2025 period compared to the 2025-2040 period. Thus, a higher proportion of the expansion transportation investments are anticipated in the short-term and mid-term compared to the long-term.

As documented in *Chapter 8*, forecasted funding levels are:

- **Non-Interstate Roadway Expansion Funding Levels** through 2040 are **\$332,800,000**.
- **Interstate Funding Levels** for both expansion and preservation projects through 2040 are **\$123,000,000**.

The roadway expansion cost distribution through 2040 includes:

- The project **Non-Interstate Roadway Expansion Costs** in the 2040 LRTP Roadway Plan through 2040 are **\$332,800,000**. These costs include the additional moved from expansion to preservation to address the additional the Memorial Highway reconstruction project needs.
- The project **Interstate Roadway Expansion Costs** in the 2040 LRTP Roadway Plan through 2040 are **\$51,410,000**.

An analysis of the roadway expansion funding levels compared to anticipated roadway expansion costs shows that:

- Non-interstate roadway expansion funds of \$332,800,000 are anticipated to be fully spent through 2040.
- Of the forecasted Interstate total funds of \$123,000,000 through 2040, \$52,310,000 are anticipated to be spent on expansion projects on the Interstate system²⁰. The remaining **\$71,590,000** in Interstate funds would be used for **preservation of the Interstate system** through 2040. As noted in *Chapter 8*, during the 8-year TIP period (2007 – 2014) used for these forecasts all Interstate project funding was used for Operations and Maintenance (O&M) and state-of-good repair projects. The *Interstate 94 Corridor Study* has identified an extensive set of system needs through 2040. The LRTP has assumed that a significant portion of all Interstate funds (\$51,410,000 or 42%) will need to be spent to fund a portion of the Sunset Drive, Mandan Avenue, Tyler Parkway, and State Street interchange reconstructions and a new interchange at 66th Street, while still leaving some monies for state-of-good repair projects. This level of funding leaves significant levels of unfunded interchange reconstruction needs that cannot be met based on past Interstate funding levels in the Bismarck-Mandan area.

9.1.3 ROADWAY PLAN PERFORMANCE

The roadway plan addresses many critical mobility and safety issues identified through the LRTP process. One of the key performance improvements associated with the 2040 LRTP-recommended roadway plan is the improvement in regional mobility compared to the 2040 existing-plus-committed (E+C) scenario.

Table 9-4 shows the significant reduction in VMT, VHT, and increase in estimated peak hour system speeds forecasted for the LRTP network scenario compared to the E+C scenario. These indicate improved regional mobility and improved connectivity in the 2040 LRTP scenario compared with E+C scenario.

²⁰ The NDDOT Local Government Manual states that cities are required to fund grade-separated, non-interchange roads and interchange projects which are a result of cross-road traffic. With Interstate funds moving to the National Highway Performance Program, it is assumed that *some* of the future funds that were previously Interstate funds could be used for these projects, although a significant portion has come from the Regional / Urban Roads funds.

Table 9-4. 2040 Draft LRTP Network System Performance: Comparison to E+C Scenario VMT, VHT and System Speeds

Functional Class	Vehicle Miles Traveled		Vehicle Hours Traveled		System Speeds	
	2040 E+C	2040 LRTP Network	2040 E+C	2040 LRTP Network	2040 E+C	2040 LRTP Network
Interstate	497,754	538,186	9,989	10,641	49.8	50.6
Major Arterials	1,345,633	1,310,568	56,708	40,324	23.7	32.5
Minor Arterials	770,826	631,070	40,924	19,395	18.8	32.5
Collectors	563,084	485,577	30,607	17,157	18.4	28.3
Total System	3,177,297	2,965,401	138,228	87,517	23	33.9

Source: ATAC, Bismarck-Mandan Travel Model

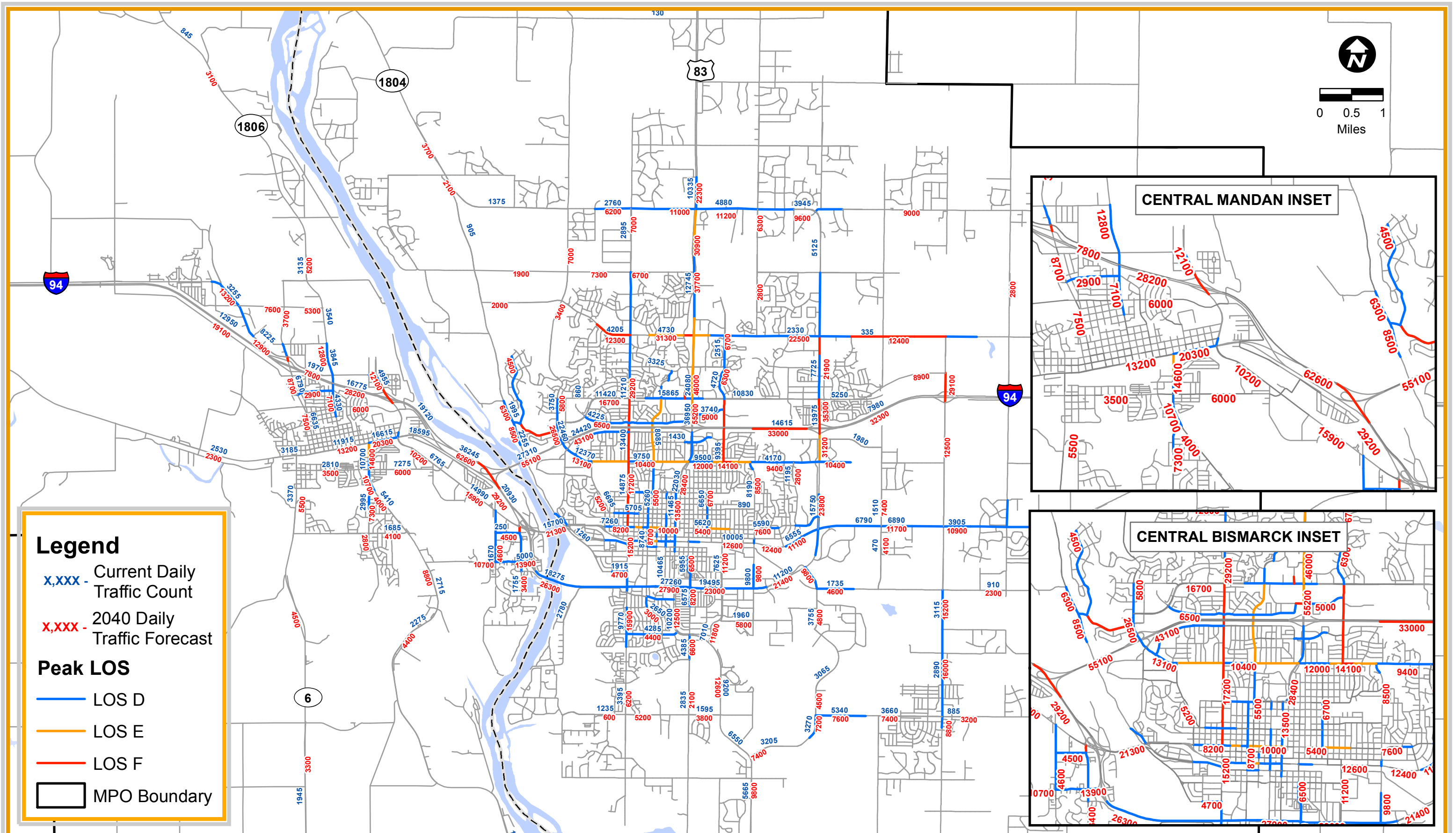
Future 2040 traffic forecasts on the Long Range Transportation Plan network are shown in **Figure 9-4**. Note that Roadways not shown as LOS D, E, or F in **Figure 9-4** were estimated to be LOS A, B, or C. While there are still many locations where peak traffic operations will still operation at LOS D or worse in the 2040 LRTP network scenario, **overall time spent in traffic on the roadway network** (represented by VHT), is projected to decrease by nearly 40% in the LRTP scenario compared to the E+C scenario.

High Priority Unfunded Roadway Projects

Due to the expanded future system needs and limited resources for system expansion there were not sufficient levels of projected future funding to include several high-priority projects in the plan; high-priority projects as defined by the performance measures and alternatives scoring used for this study. Among some of the highest-priority projects that are not part of the fiscally-constrained plan include:

- **Alternative B1:** Widen US 83 north of 57th Street.
- **Alternative B4b:** Widen future 66th Street to 4-lanes between Century Avenue and I-94.
- **Alternative B9:** Widen Highway 10 / add turn lanes between Bismarck Expressway and 66th Street.
- **Alternative B12:** Hamilton Street connection between Divide Avenue and Century Avenue with I-94 Crossing.
- **Alternative B18:** 43rd Avenue widening west of Centennial Road.
- **Alternative B19:** 3-lane widening of 43rd west of Washington.
- **Alternative B22b:** 3-lane widening along 19th Street between Century Avenue and 43rd Avenue.
- **Alternative B54:** Widen Centennial Road at I-94.
- **Alternative B75:** Reconstruct Centennial Road / I-94 Interchange.
- **Alternative M5:** West Mandan Interchange at 56th Avenue.
- **Alternative M6:** Connection at 32nd Avenue NW between Boundary Road and Old Red Trail.
- **Alternative M26:** I-94 at I-194 / Bismarck Expressway / Main St interchange.
- **Alternative M33b:** Reconstruct Mandan Avenue / I-94 Interchange Bridge for wider Mandan Avenue.
- **Alternative R1:** Northern Bridge Corridor between 38th St in Mandan and 57th Avenue in Bismarck.

These projects are shown as illustrative projects in **Figure 9-5**.

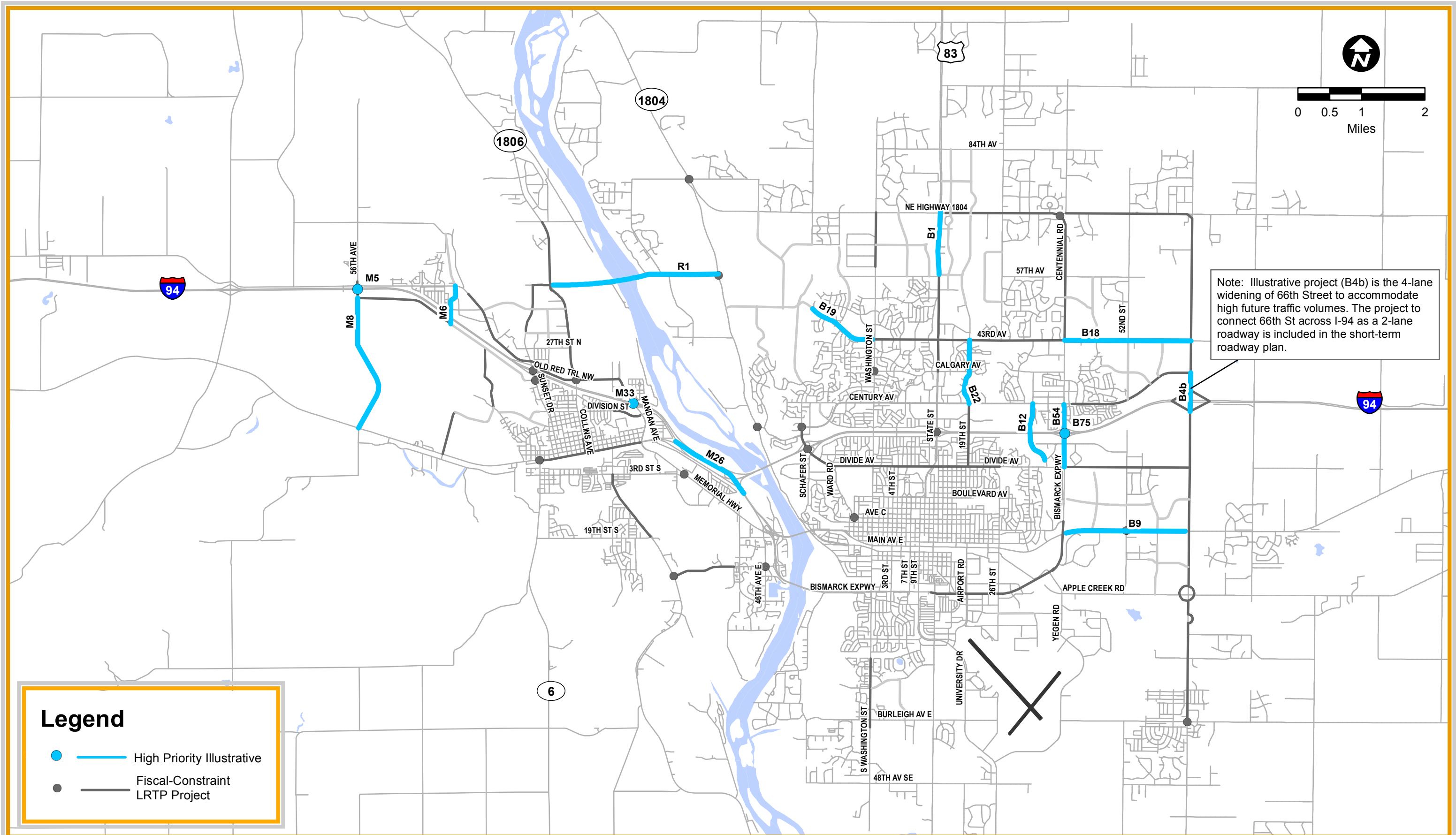


Sources: Bismarck-Mandan MPO Travel Model, NDDOT Counts, HCM ARTPLAN, HDR, I-94 Corridor Study, State Street Safety Study

Future 2040 Long Range Transportation Plan Network Traffic Forecasts and Peak Hour Operations

Figure: 9-4

Date: February 2015



Timing of the Interstate 94 / 66th Street Interchange

Project B7, a **new interchange at Interstate 94 and 66th Street**, was placed in the Mid-Term period (2024-2032) of the 2040 LRTP to meet Federal fiscal constraint requirements for metropolitan transportation plan development. This project is a high priority for the City of Bismarck and Burleigh County, which consider the project a critical short-term need. During the Bismarck Planning Commission meeting on January 28, 2015, Mayor Seminary identified this project as a high priority for the City due to the traffic safety, high traffic volumes, and high truck volumes along State Street and Centennial Road. He was concerned that traffic and trucks were diverting to Centennial Road to avoid State Street, increasing safety concerns along Centennial, a corridor that is in close proximity to, and services, two new schools. The relevant pages of minutes from that meeting, including his comments, are included in [Appendix B](#).

As such, the City of Bismarck has stated that it intends to explore and pursue additional funding opportunities, including any available state funding, to move this project up to the short-term (before 2024). If the City is successful in securing funding from non-Federal, non-traditional sources it would free up additional Federal transportation funds for other projects.

9.1.4 BICYCLE AND PEDESTRIAN PROJECTS

Short-Term Bicycle and Pedestrian Plan (Today through 2023)

The short-term plan elements are those that address current mobility and safety needs in the region. There are several individual **trail elements** included in the short-term plan, identified in **Table 9-5**.

The 2040 LRTP includes a regional-level regional assessment of the on-street bicycle system, which is the basis for the recommendations included for the short-term and mid-term on-street routes. Prior to implementation of the on-street projects a **Bicycle and Pedestrian Master Plan** should be completed. The total estimated cost for the **on-street system** (including intersection and neighborhood slow streets elements) is \$4,000,000 in 2015 dollars. It is assumed that there are enough projects in the on-street system that it will need to be implemented over several years. Thus, half of the on-street system improvements were assumed in the short-term, while the second half were assumed in the mid-term.

To estimate year-of-expenditure costs, consistent with the requirements of LRTPs, costs shown for the short-term are grown at 4% per year to 2021 dollars, the mid-point of the period 2019-2023. Not including projects currently programmed in the 2015-2018 TIP, the total bicycle and pedestrian costs in the short-term are **\$9,121,000** in year-of-expenditure costs for bicycle and pedestrian expansion projects.

Table 9-5. Short-Term Bicycle and Pedestrian Projects

ID	Project Description	Likely Funding Source	2015 Cost	Bike / Ped Year of Expenditure Cost
SUP2	Bismarck Expressway Trail	TAP	\$991,000	\$1,254,000
SUP5	43rd Avenue Trail	Roadway Project Funding		
SUP9	Burnt Boat Trail	TAP	\$110,000	\$139,000
SUP11	Washington St Tom O Leary Trail Extension	TAP	\$119,000	\$150,000
SUP 22	South Washington Sibley Park Connection	TAP	\$479,300	\$605,000
SUP23	East Main Trail – Connect to Game and Fish Pond / Trails	TAP	\$371,000	\$469,000
SUP28	West Beltway Trail	Roadway Project Funding		
SUP31	East Divide Trail	Roadway Project Funding		
SUP 37	Connection between 1806 and Harmon Lake.	TAP	\$216,000	\$266,000
SUP55	North Washington Trail	TAP	\$168,000	\$213,000
SUP58	4th St - Calgary Trail Connect	TAP	\$178,500	\$226,000
SUP60	Boundary Rd Loop	TAP	\$238,000	\$301,000
SUP 65	Division Street East	Roadway Project Funding		
SUP69	West Beltway Trail	Roadway Project Funding		
SUP73	19th St Trail	TAP	\$546,000	\$691,000
SUP74	10th Ave SW Trail	TAP	\$437,500	\$554,000
SUP86	Memorial Highway Trail	TAP	\$787,500	\$996,000
SUP87	Highway 10 - Division St Loop	TAP	\$224,000	\$283,000
SUP91	DMVW Trail	TAP	\$210,000	\$266,000
SUP95	Valley Drive Trail Extension	TAP	\$140,000	\$177,000
SUP104	71st Ave Trail	Roadway Project Funding		
SUP105	West Beltway Trail	Roadway Project Funding		
Short-Term On-Street Bicycle System	On-Street Improvements	TAP	\$2,000,000	\$2,531,000

Mid-Term Bicycle and Pedestrian Plan (2024 through 2032)

There are several individual trail elements included in the mid-term plan, identified in **Table 9-6**. The continued implementation of the on-street bicycle system elements are also anticipated to be completed in the mid-term. To estimate year-of-expenditure costs, consistent with the requirements of LRTPs, costs shown for the mid-term are grown at 4% per year to 2028 dollars, the mid-point of the period 2024-2032.

The total bicycle and pedestrian in the mid-term are **\$14,937,000** in year-of-expenditure costs for bicycle and pedestrian expansion projects.

Table 9-6. Mid-Term Bicycle and Pedestrian Projects

ID	Project Description	Likely Funding Source	2015 Cost	Bike / Ped Year of Expenditure Cost
SUP1	Mandan River Connector	TAP	\$1,246,000	\$2,075,000
SUP3	Lincoln Rd - Yegen Rd Trail	TAP	\$1,559,000	\$2,600,000
SUP5	43rd Avenue Trail	Roadway Project Funding		
SUP7	Valley Dr - Country West Connector	TAP	\$148,000	\$247,000
SUP6	Centennial Rd Trail	Roadway Project Funding		
SUP12	7th St Trail	TAP	\$259,000	\$432,000
SUP13	Capitol Boulevard Trail Extension	TAP	\$47,000	\$78,000
SUP16	Marina Trail	TAP	\$248,500	\$414,000
SUP17	3rd St Trail	TAP	\$395,500	\$659,000
SUP19	Mills Ave Trail	TAP	\$133,000	\$221,000
SUP 20	Century Avenue Trail Extension	Roadway Project Funding		
SUP25	Highway 10 East Trail	TAP	\$707,000	\$1,643,000
SUP27	Calgary Trail Extension	TAP	\$269,500	\$449,000
SUP30	State Street Trail Extension	Roadway Project Funding		
SUP35	Calgary Trail Extension	TAP	\$329,000	\$548,000
SUP49	Centennial Rd Trail Extension	Roadway Project Funding		
SUP52	North 19th St Trail	TAP	\$245,000	\$408,000
SUP54	North Washington Connector	TAP	\$66,500	\$111,000
SUP61	McKenzie Trail Extension West	Roadway Project Funding		
SUP70	McKenzie Trail Extension	TAP	\$143,500	\$239,000
SUP79	State Street Trail Extension	TAP	\$320,000	\$533,000
SUP80	Century Ave Trail Extension	Roadway Project Funding		
SUP83	Sunset Extension	Roadway Project Funding		
SUP84	Southland - Cottonwood Connector	TAP	\$143,500	\$239,000
SUP88	71st Ave Trail	Roadway Project Funding		
SUP98	Calgary Trail Extension	TAP	\$248,500	\$414,000
SUP99	Star Gazer Park Trail Connection	TAP	\$178,500	\$297,000
Mid-Term On-Street Bicycle System	On-Street Improvements	TAP	\$2,000,000	\$3,330,000

Long-Term Plan (2033 through 2040)

There are several individual trail elements included in the long-term plan, identified in **Table 9-7**. To estimate year-of-expenditure costs, consistent with the requirements of LRTPs, costs shown for the long-term are grown at 4% per year to the average of 2036 and 2037 dollars, the mid-point of the period 2033-2040.

The total bicycle and pedestrian in the long-term are **\$11,312,000** in year-of-expenditure costs for bicycle and pedestrian expansion projects.

Table 9-7. Long-Term Bicycle and Pedestrian Projects

ID	Project Description	Likely Funding Source	2015 Cost	Bike / Ped Year of Expenditure Cost
SUP8	Riverfront Trail Extension	TAP	\$678,000	\$1,576,000
SUP18	Riverwood Golf Course	TAP	\$301,000	\$699,000
SUP26	Hwy 1804 Trail	TAP	\$990,500	\$2,302,000
SUP38	Apple Creek Rd Trail	TAP	\$700,000	\$1,627,000
SUP51	DMVW Trail	TAP	\$707,000	\$1,643,000
SUP82	Northern Mandan Connector Trail	TAP	\$490,000	\$1,139,000
SUP89	Hwy 1804 Trail	TAP	\$651,000	\$1,513,000
SUP106	71st Ave Trail	TAP	\$350,000	\$813,000

Bicycle and Pedestrian System Costs and Forecasted Funding

This section provides an overview of the bicycle and pedestrian system plan costs in relation to the anticipated funding sources identified in *Chapter 8*.

- As documented in *Chapter 8*, forecasted **Bicycle and Pedestrian Funding Levels** through 2040: \$35,650,000.
- The project **Bicycle and Pedestrian Costs** in 2040 LRTP Roadway Plan through 2040: \$35,370,000.

Thus, anticipated bicycle and pedestrian funding levels are consistent with bicycle and pedestrian project costs.

Additional Bicycle and Pedestrian Projects from the Downtown Bismarck Study

Two projects from the *Downtown Bismarck Study* were not included in the fiscally-constrained plan, but generally scored relatively highly and would fit well within the multimodal framework included in the 2040 Plan:

- **Downtown Bicycle and Pedestrian Rail Trail.**
- **5th Street Pedestrian Underpass of the BNSF railroad.**

As noted in the Downtown Study, both of these projects will require significant investment, additional study, project development, and coordination with the BNSF railroad. As elements of the Downtown Study come together, it is suggested that both of these projects be evaluated more fully.

9.1.5 TRANSIT PROJECTS

The recommended short-term transit elements focus on the recommendations provided in the *Mobility 2017 Final Report*. That report referred to those recommendations as the “**Expansion Scenario**”. These core projects focus on increasing service levels through the route adjustments reflected in **Figure 9-3**.

Additional route extensions may become practical as the community continues develop and funding partners are identified. It is recommended that these route extensions (such as **service to Lincoln and University of Mary**) be implemented when funding partners are secured. These route extensions should be cost-constrained and not degrade service on the core recommended routes documented in *Mobility 2017*.

Transit Plan Costs

The *Mobility 2017* study provides a 5-year funding analysis of the expansion scenario, shown in **Table 9-7**. The most recent transit funding information documented in *Chapter 9* indicate a trend of future transit funding levels higher than the funding assumptions provided in *Mobility 2017*. Thus, the transit elements included in this plan are fiscally-constrained.

Table 9-7. Mobility 2017 Funding Evaluation

Operating Revenues	2012	2013	2014	2015	2016	2017
Status Quo Scenario						
FTA Funding Programs	\$1,022,440	\$1,038,198	\$1,054,205	\$1,070,465	\$1,086,983	\$1,103,763
State Aid Funds	\$324,137	\$333,861	\$343,877	\$354,193	\$364,819	\$375,763
Local Funding Sources	\$1,527,347	\$1,550,827	\$1,572,175	\$1,591,981	\$1,610,037	\$1,696,543
Operating Revenues	\$2,873,924	\$2,922,885	\$2,970,267	\$3,016,638	\$3,061,839	\$3,176,069
Expansion Scenario						
FTA Funding Programs	\$1,022,440	\$1,038,198	\$1,054,205	\$1,070,465	\$1,086,983	\$1,103,763
State Aid Funds	\$324,137	\$333,861	\$343,877	\$354,193	\$364,819	\$375,763
Local Funding Sources	\$1,527,347	\$1,577,350	\$1,662,423	\$1,695,775	\$1,758,282	\$1,831,308
Operating Revenues	\$2,873,924	\$2,949,408	\$3,060,515	\$3,120,433	\$3,210,082	\$3,310,833

Source: *Mobility 2017* Final Report.

9.1.6 MANDAN RAIL PROJECT

Stakeholders in Mandan have identified a rail transportation element that could potentially enhance the regional economy: extension of a rail spur from the BNSF rail line on the west side of Mandan to the north. The idea would be to connect to future industrial and commercial growth, and in the long term potentially crossing the interstate and serving the existing industrial park along Old Red Trail. No feasibility for the route has been studied, and no funding has been tied to this project, so this is not a fiscally-constrained element of the 2040 LRTP.

If implemented, funding would likely involve both private and public sources. There are some Federal grant programs that can be used for rail spur economic development. NDDOT has some programs with limited funding levels to support rail enhancements for local jurisdictions, including the Local Rail Freight Assistance (LRFA) program and the Freight Railroad Improvement Program (FRIP). These projects are target on lower volume tracks which accomplishes any of the following: rehabilitates a segment of rail line, results in economic development, improves transportation efficiency, promotes safety, promotes the viability of

the statewide system of freight rail service, assists intermodal freight movement, or provides industry access to the national railroad system.²¹

9.1.7 ELEMENTS TO ADDRESS NORTH-SOUTH MOBILITY IN BISMARCK

Several projects and programs included in the fiscally-constrained roadway, bicycle and pedestrian, and transit plans directly address current and future north-south mobility needs in Bismarck. As noted in Chapter 5, in fully-developed portions of urban Bismarck there are several factors that limit the ability to develop new north-south corridors or add new through lane capacity to existing north-south arterial corridors. Those limitations include discontinuous arterial corridors, on-street parking in urban neighborhoods where little or no off-street parking is available, and dense driveway access spacing along arterial streets. Thus, a combination of new / widened corridors on the urban fringe, targeted system management, new bicycle and pedestrian facilities, more efficient transit service, and future detailed studies are recommended:

- Several **expansion projects** are included on the project list that would benefit north-south mobility in Bismarck. These include making 66th Street an improved and continuous corridor from 71st Avenue to Lincoln Road with an Interchange at I-94, a reconfigured State Street / I-94 interchange, widening 71st Avenue and Centennial Road to 3 lanes between US 83 and 43rd Avenue, developer-funded collector road improvements in northwest Bismarck between Washington Street and River Road, widening of north Washington Street, and widening of State Street / US 83 from Calgary Road to 57th Avenue.
- Several **system management projects** are included on the project list. These include Bismarck Signal System upgrade, State Street safety improvements / turn lane additions between Divide Avenue and Calgary Avenue (current TIP project), turn lane additions along 19th Street north of Divide, improvement of the Ward Road/Avenue C intersection, and turn lane additions to Divide Avenue (which facilitates connections between some north-south corridors such as 19th Street north of Divide and 26th Street south of Divide).
- Several **bicycle and pedestrian** projects such as north-south oriented bike lanes, quiet streets / bike boulevards, trails and bicycle and pedestrian intersection improvements.
- Improved **transit system routes** that improve the efficiency and provide more frequent bus service, including 7 routes that provide north-south travel in Bismarck.
- Several **recommended future studies** (discussed in more detail in section 9.3) would provide additional details to implement lower-cost, lower-impact recommendations to improve north-south mobility, including a Travel Demand Management Study, a Bismarck Signal System Master Plan, and a System Management / Low-Cost Urban Corridor Improvements Study.

9.2 ITS ELEMENTS

Intelligent Transportation System (ITS) elements are technology and communications improvements that provide improved mobility, safety, and efficiency to the transportation system. The framework for ITS in the Bismarck-Mandan region is provided by the *Bismarck-Mandan Regional ITS Architecture*. This document was

²¹ *North Dakota State Rail Plan*, December 2007

prepared in March 2005, and has been updated twice since the original development in 2008 and 2013. The goal of the Bismarck-Mandan regional architecture (RA) is to guide the implementation of ITS in the Bismarck-Mandan region and coordinate funding, deployment, information sharing, and operations of ITS systems in the region.

The plan identifies the regional stakeholders in the ITS systems, current system assets, system needs, and the range of ITS user services, including:

- Travel and Traffic Management
- Public Transportation Management
- Incident Management
- Information Management
- Maintenance and Construction Management

The 2040 LRTP recommendation includes the Bismarck Traffic Signal System Upgrade project. This project would strongly support ITS development in the region.

9.3 RECOMMENDED FUTURE MPO STUDIES

The 2040 LRTP is a regional document that sets priorities and identifies future projects and programs at a planning level. There are some programs / projects identified in the 2040 LRTP that will require more detailed study during the project development process. Some potential MPO-sponsored studies that may be considered in the near term include:

- **Regional Traffic Safety Study:** Throughout development of the 2040 LRTP, traffic safety issues beyond the scope of the LRTP were raised. It is recommended that the study include an assessment of regional safety performance, including potential policy and enforcement responses to the issues raised.
- **Bike and Pedestrian Master Plan:** There were several recommendations for improvements to the Bicycle and Pedestrian included in the LRTP. It is recommended that a Bicycle and Pedestrian Master Plan be completed to provide a detailed implementation plan. A Bicycle and Pedestrian Master Plan would add definition to the comprehensive on-street system framework provided by the 2040 LRTP. The master plan will need to identify specific cross-section recommendations and treatments by corridor, and identify feasible intersection and traffic signal improvements that accommodate traffic flow, while addressing bicycle and pedestrian mobility and safety needs.
- **Bismarck Signal System Master Plan:** This study would include a comprehensive review and recommendations that provide an implementation plan for upgrading signal hardware and fiber communications, including potentially a traffic management / operations center at City Hall.
- **System Management / Low-Cost Urban Corridor Improvements Study:** Several recommendations in the 2040 LRTP include system management projects in fully developed corridors that will require detailed implementation plans. This enhanced study should involve a block-by-block basis for the signing, striping, minor widening, and intersection upgrades associated with the system management projects.

- **Downtown Mandan Subarea Study:** Several options for operational adjustments / improvements along Main Street and cross-streets in downtown Mandan were discussed during the course of 2040 LRTP process. Many of the options included conversion of streets to one-way operation, changes to on-street parking configuration and require a targeted, detailed evaluation and stakeholder engagement program. The range of potential improvements would best be implemented following a detailed subarea circulation study.
- **Regional Household Survey for Travel Model Support:** The current regional travel model is based on national estimates of travel characteristics, and potentially 40-year old survey data from the Bismarck-Mandan region. The travel model is an important tool for use as performance measurement perspectives are implemented in the region. A regional household survey would provide a statistically valid sample of household travel behavior in the region, and provide a basis for state-of-the-art updates to the model parameters, as recommended in the 2012 *Bismarck-Mandan MPO Travel Demand Model Study*. This survey would provide a strong baseline to develop other model enhancements discussed in the Travel Model Improvement Study.
- **Travel Demand Management Study:** A recommendation for later in the planning horizon would be a Travel Demand Management Study. This type of study would provide specific recommendations for programs targeting the reduction of single-occupant vehicle travel during peak travel periods. Options such as a carpool coordination program, employer association for travel management, vanpool programs, and park and ride lots should be considered over the long-term.
- **Continued Pavement Asset Monitoring and Management:** The 2012 pavement condition assessment project summarized in the *State of the Streets* reports provided a baseline for pavement conditions in the MPO area. That program should continue with an ongoing monitoring system, to provide more details on pavement performance over time, and enhanced ability to evaluate future investment requirements for state-of-good-repair, consistent with upcoming MAP-21 performance requirements.
- **Neighborhood Parking Assessment:** Neighborhood parking issues were identified as a concern during the public involvement elements of the 2040 LRTP. On-street parking availability was used as a performance measure in the plan. A more detailed study that looks at on-street and public lot utilization in residential and commercial areas would identify areas of parking needs, and management and investment programs that might be required. This work should include coordination with any work / study completed by the Bismarck Downtown Parking Task Force and the regional Parking Authorities.

9.4 ALTERNATIVE FUNDING OPTIONS

As noted in this chapter, there are several projected transportation system needs that cannot be funded through traditional Federal funding sources. The FHWA has historically financed highways primarily through allocations that cover approximately 80 percent of a project's total costs, varying somewhat depending on project type. Due to the fiscal constraints on Federal, State, and local budgets this approach alone cannot meet the nation's transportation investment needs. As a result, innovative financing for highway improvements has been pursued by communities and states across the country with the hope that these techniques will supplement traditional funding resources.

FHWA considers innovative finance as “a broadly defined term that encompasses a combination of specially designed techniques that supplement traditional highway financing methods. While many of these techniques may not be new to other sectors, their application to transportation is innovative.”²² According to FHWA, the primary objectives of innovative finance are to:

- Maximize the ability of states and other project sponsors to leverage federal capital for needed investment in the nation's transportation system;
- More effectively utilize existing funds;
- Move projects into construction more quickly than under traditional financing mechanisms; and
- Make possible major transportation investments that might not otherwise receive financing.



There are a number of innovative financing techniques available to support funding for roadway interchanges and bridge improvements. They include:

- **Advance Construction (AC) and Partial Conversion of Advance Construction (PCAC):** AC allows a state to begin a project even if the state does not currently have sufficient federal-aid obligation authority to cover the federal share of project costs. Under PCAC, a state may elect to obligate funds for an advance-constructed project in stages.²³
- **Tapered Match:** Under the tapered match approach, the non-federal matching ratio is imposed on projects rather than individual payments. Federal reimbursement of state expenditures can be as high as 100 percent in the early phases of a project provided that by the time the project is complete, the overall federal contribution does not exceed the statutory federal-aid limit for the project in question.²³
- **Flexible Match:** Allows states to substitute private and other donations of funds, materials, land, and services for the non-federal share of funding for highway projects. Flexible match provisions support public-private partnerships (P3s) by providing incentives to seek private donations.²⁴
- **Toll Credits:** States may use revenue from toll facilities as a credit toward the non-federal matching share of certain highway projects.
- **Grant Anticipation Revenue Vehicles (GARVEE Bonds):** GARVEEs permit states to pay debt service and other bond-related expenses with future federal-aid highway apportionments.
- **Value Capture Strategies:** Involve leveraging the projected future value of property due to the infrastructure improvement.

²² *Innovative Finance Primer 2004*, USDOT, FHWA.

²³ Given the current uncertainty of long term Federal highway funding, due to the lack of a long-term highway authorization, NDDOT is not currently allowing the practice of AC or tapered matches.

²⁴ NDDOT does not currently participate in in-kind matches.

More in-depth discussion is provided for three of the options likely most relevant to the 2040 LRTP:

- Value capture strategies
- GARVEE bonds.

Each of these funding techniques is described and examples of real projects that have utilized these approaches are provided.

9.4.1 VALUE CAPTURE

Investment in infrastructure is often publicly funded through government budget line-item, public bonding, or award of federal or state grants. With pressure on sources and uses of public resources increasing, more attention is being given to private participation in infrastructure finance. Value capture strategies are one type of public-private partnership (P3) that may be utilized to support transportation investment. Several of these approaches are described below.

When an infrastructure investment is made, there is often an increase in the value of the surrounding real estate. When an increase in property value and private investment generates an increase in tax revenues, this increase is considered the "tax increment." **Tax increment financing** dedicates these tax increments within a certain defined district to finance the debt that is issued to pay for the project. TIF creates funding for public or private projects by borrowing against the future increase in these property tax revenues.

TIF was originally designed to channel funding toward improvements in distressed, underdeveloped, or underutilized parts of a jurisdiction where development might otherwise not occur. Cities in North Dakota are allowed to utilize tax increment financing (TIF) under the urban renewal law in North Dakota Century Code Chapter 40-58 as an economic development tool for a development or renewal area. North Dakota law on TIF was first enacted in 1973 but was amended in 1989 to make this vehicle available to develop industrial or commercial property. This brought into question whether a renewal or "blighted area" for purposes of TIF can be considered to include agricultural property. While this appears to remain a matter of opinion, the North Dakota Legislative Assembly had an opportunity in 2003 to exclude open land used for agricultural purposes from TIF district development but did not choose to enact the legislation.²⁵

With a TIF, a public-sector agency typically issues bonds to finance the infrastructure necessary to support new development. The incremental increase in property value within a formally designated TIF district is then used to fund repayment of the bonds for the development-related costs, including the improvements. When applied to transportation projects, TIF districts can be expanded beyond the exact site of a transportation improvement to encompass an area where an incremental property value increase is anticipated. Because there is a perception that projects "pay their own way," TIF districts are often relatively well-received by the public. Generally, TIF is used to help finance the capital costs of large infrastructure projects rather than for longer-term on-going operational support.

Special assessment districts allow property owners to designate an area in which new taxes or fees are assessed on properties that are expected to receive a benefit from their geographic proximity to an

²⁵ "Tax Increment Financing to Develop Property, Prepared by the North Dakota Legislative Council staff for the Taxation Committee, February 2010, <http://www.legis.nd.gov/assembly/61-2009/docs/pdf/19243.pdf>.

improvement. The idea is that certain properties will benefit directly from a particular investment and, as a result, these property owners should pay an allocable share of the investment cost. Assessment districts may be delineated based on distance from an improved facility, property frontage adjacent to an improved facility, square footage and/or property acreage. The revenue collected from the special assessment district is used to help pay for the improvement. The property owner's payment is above and beyond the real property taxes.

Development Impact Fees are one-time charges collected by local governments from developers. These fees help to defray the cost of new or expanded infrastructure and services associated with new development, including capacity-increasing transportation investments. Impact fees are not a primary source of revenue for transportation in most jurisdictions, but they can help finance the share of transportation budgets attributable to new development. Generally, development impact fees are considered politically and administratively feasible.

TIF Example: I-75/Austin Boulevard Interchange, Ohio

This is a northern anchor of the I-75 growth corridor between Cincinnati and Dayton. A \$43 million interchange project, it constructed four new ramps located at exit #41 along I-75 between SR 725 and SR73. These ramps were designed to relieve congestion on existing I-75 ramps and allow greater access to the interstate. Funding for the project came from a number of different sources:²⁶

- Ohio DOT Transportation Review Advisory Council (TRAC): \$13.6 million
- MPO: \$2.1 million in Congestion Mitigation and Air Quality Improvement (CMAQ) and Transportation Enhancement (TE) funds.
- Federal Earmarks: \$12.6 million
- Miscellaneous Other: \$1.0 million
- Local Government: \$13.7 million

The local government match included a TIF and general obligation pledges from three jurisdictions. The TIF term is 30 years for 100 percent of valuation.

9.4.2 GRANT ANTICIPATION REVENUE VEHICLE (GARVEE) BONDS

A GARVEE is a type of "anticipation vehicle," which is a security (debt instrument) that anticipates future funding from a specific source but is issued to advance the upfront funding of a particular project. In the case of transportation, the anticipation vehicles' revenue source is expected federal-aid grants.²⁷ GARVEEs enable states to accelerate construction timelines and spread the cost of a transportation investment over its useful life rather than just the construction period. GARVEES are appropriate for large, long-lived, non-revenue generating assets.

²⁶ OTEC 2009 presentation, <http://www.dot.state.oh.us/engineering/OTEC/2008%20Presentations/33B.pdf>.

²⁷ FHWA, http://www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/garvees/default.aspx

GARVEE Example 1: Arkansas Interstate Rehabilitation Program²⁸

In 1996, approximately 30.5 percent of rural interstates and 25.2 percent of urban interstates in Arkansas were rated in poor condition. It was estimated that the state system needed investments of about \$6.9 billion over 10 years. The interstates' 10-year repair needs were estimated at about \$1.075 billion. The state did not have the funding available.

Following a number of legislative actions and research by a governor-appointed Citizens Council on Highways and Transportation, a funding package was developed to fill in the funding gap. It included the issuance of bonds secured by future transportation funding (i.e., GARVEE bonds) and two fuel taxes, a phased-in three cent gasoline tax increase and a four cent diesel fuel tax increase over two years.

To help finance reconstruction of the state's interstate highways on an accelerated schedule, \$575 million in GARVEE bonds were issued. The Arkansas bonds are backed by the full faith and credit of the state, along with state motor fuel taxes. Future federal funds, together with the required state matching funds and the proceeds from the phased-in four cent diesel fuel tax, will be used to retire the bonds.

The Interstate Rehabilitation Program (IRP), as it is known, rebuilt approximately 380 miles, or 60 percent of Arkansas' total Interstate miles within five years. The total cost of this rehabilitation program was estimated to be \$950 million. When construction began in the spring of 2000, the Arkansas Highway and Transportation Department began rehabilitating about 125 miles of interstates annually, compared to the 12 to 15 miles previously funded with pay-as-you-go financing.

Other Recent GARVEE Examples Related to Bridges:²⁹

- The Commonwealth of Kentucky issued \$212.55 million in GARVEEs for the design, development and construction of the new Ohio River Bridges Downtown Crossing, which is a new northbound crossing of I-65 over the Ohio River between Louisville, Kentucky and Southern Indiana, currently under development as a design-build project with traditional and toll financing.
- Washington State issued its second-ever set of GARVEEs to continue funding the SR 520 Floating Bridge project in the Seattle region. The issuance of \$285.92 million follows May 2012's offering of \$500.4 million to help finance the \$2.7 billion project that is replacing the existing floating bridge across Lake Washington connecting Seattle with Bellevue and Redmond. As with the previous GARVEE issuance, the bonds are "Triple Pledge Bonds," which are general obligation bonds backed first by toll revenue from the existing floating bridge, second by motor fuel taxes, and third by general state revenues.
- In September 2012, the District of Columbia issued \$43 million in GARVEEs to support the second phase of its Eleventh Street Bridge project. Early in 2011, it had issued \$83 million to support Phase I. (This project also an example of flexible matching).
- Mississippi issued \$163 million in GARVEEs for various road and bridge improvements.

²⁸ FHWA, http://www.fhwa.dot.gov/ipd/finance/resources/general/innovative_finance_primer_2004.aspx#chapter6

²⁹ FHWA, http://www.fhwa.dot.gov/ipd/finance/tools_programs/federal_debt_financing/garvees/archived_highlights.aspx

Chapter 10 MAP-21 IMPLEMENTATION AND ENVIRONMENTAL CONSIDERATIONS

This chapter provides a summary of additional MAP-21 implementation and environmental coordination activities related to the 2040 LRTP.

10.1 MAP-21 PERFORMANCE MEASUREMENT REQUIREMENTS

As discussed in *Chapter 1*, the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) has increased the emphasis placed on performance measurement at all levels of transportation planning. Specifically, Federal code requires:

"The metropolitan transportation planning process shall include the development of a transportation plan addressing no less than a 20-year planning horizon as of the effective date." 23 CFR 450.322.

"The metropolitan transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decision making to support the national goals...." 23 USC §134(h)(2).

The rulemaking on how performance measurement and performance targets will be incorporated into the planning process are still being established. To the extent possible, the *2015-2040 Bismarck-Mandan LRTP* has incorporated the direction provided on performance measurement. Specifically, this plan provides:

- Goals, objectives and performance measures that reflect the National Performance Goals and Planning Factors provided in MAP-21.
- A baseline for initiating performance measurement, by providing existing and future conditions assessments that evaluate mobility and safety through the guidance provided in MAP-21, and the draft rulemaking guidelines provided on safety in June 2014.
- A funding assessment that assumes increasingly higher shares of regional funding being spent on maintaining the current system in a state-of-good repair.
- An alternatives assessment and prioritization process that measured projects and programs against the stated goals, objectives and performance measures, and that included consideration of local support, community desires, and continuing current commitments and projects to completion.

Over the course of the coming months, it is anticipated that the FHWA will finalize the rulemaking. After that, the NDDOT and the North Dakota MPOs will work together to develop a set of performance measures and targets for metropolitan transportation planning. The performance measures provided in the existing conditions assessments, future conditions assessments, and alternatives assessment reflect any current available direction on performance measurement tailored to fit the unique goals and objectives for the Bismarck-Mandan transportation system.

The MPO has initiated an ongoing performance measurement process through their annual "Monitoring Report". The 2012 report (completed in early 2014) is included in [Appendix C](#) for reference. It is

recommended that this monitoring report be part of an ongoing process to comply with the MPO planning requirements under MAP-21. When final performance measures and targets have been set in the near future, the contents of the monitoring reports can be adjusted accordingly.

10.1.1 **BASELINE PERFORMANCE MEASURES**

The rulemaking on performance measurements and locally-tailored performance targets were still being established at the time of LRTP development. To the extent possible, the 2040 LRTP has incorporated the direction provided to date. Preliminary performance measures, subject to change after performance measure rules and local performance targets have been set, have been established for the 2040 LRTP and include:

- **Reducing Injury and Fatal Crashes and Crash Rates:** The 2012 *Monitoring Report* establishes a baseline for this measure. Current performance for this performance measure was provided in *Chapter 5*. This will be an ongoing performance measure for the MPO to track in the coming years. Draft rulemaking has been published by FHWA on this topic.
- **Improving Transit Travel Time:** *Chapter 5* provided a baseline measure for current commute (home-base work) travel times.
- **Reducing the Growth Rate of VMT and VHT:** In a fast-growing community like Bismarck-Mandan, with limited transportation funding to invest in the system, maintaining current levels of VMT and VHT are not reasonable. Identifying an achievable target that will maintain locally-acceptable mobility levels should be set. Current performance for this measure was provided in *Chapter 5*, future 2040 E+C performance for this measure was provided in *Chapter 6*, and future 2040 LRTP performance for this measure was provided in *Chapter 9*. The 2040 LRTP has reviewed and prioritized projects based on their potential to provide improved regional mobility via reduced VHT and VMT levels compared to the 2040 existing-plus-committed (“do nothing”) scenario. Programs and projects should be implemented that reduce VMT and VHT on the regional system.
- **Improving system travel time reliability:** It is recommended that the MPO start acquiring travel speed and travel time data to support travel time reliability assessment. Travel time reliability represents the level of travel time repeatability or uncertainty across a given corridor or study area. Planning methods that compare 95th or 90th percentile speeds to 50th percentile speeds are examples of planning indices that measure the volatility of travel times for given corridors. The data needed for these analyses can be collected or purchased as travel time datasets available from vendors such as HERE or INRIX. As the regional ITS system evolves, there may be additional sources from which to collect this data.
- **Increasing Transit Ridership:** *Chapter 5* provided a baseline for current ridership levels.
- **Decreasing Transit Travel Time to Work:** When changes are made to the transit routes or paratransit operations, it is an opportunity to assess if average transit commute time improved. *Chapter 5* provided 5-year American Community Survey estimates of current average travel time to work via public transit.

10.2 ENVIRONMENTAL ANALYSIS

It is important for the 2040 LRTP to evaluate the alternatives for how well they fit within the natural and built environment, and to consult with state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. **Figure 10-1** shows some of the environmentally sensitive areas in the study area. An environmental screening of the roadway alternatives was included as a part of the alternatives assessment. This section provides some additional information on that screening.

10.2.1 ENVIRONMENTAL SCREENING / CONSIDERATIONS

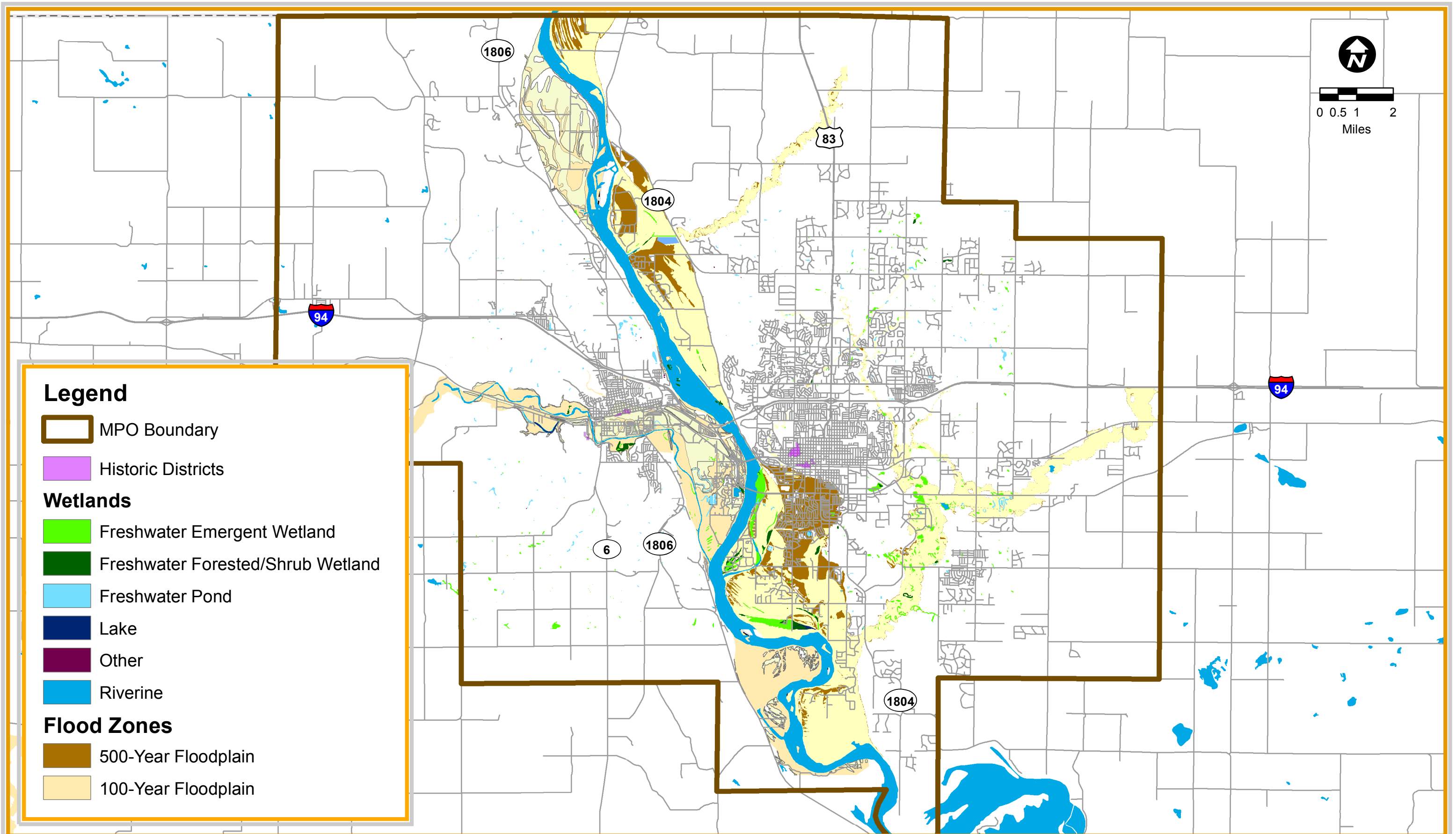
Environmental resources that could potentially be affected by transportation projects included in the 2040 LRTP are discussed in this section. The LRTP process included the screening of environmental characteristics for each alternative. The 2040 LRTP is a regional-scale assessment, and projects included in the LRTP will require additional project development prior to implementation. As those project details are developed, more detailed environmental review will be conducted in the future phases of study. Details on the environmental screening are provided in the Alternatives Assessment materials provided in [Appendix D](#).

Archaeological and Historical Resources

Historic and cultural resources are regulated under Section 106 of the *National Historic Preservation Act*, and may require consultation with the North Dakota Department of Transportation (NDDOT) and the North Dakota State Historic Preservation Office (SHPO).

Those archaeological and historical data that were available for the 2040 LRTP were reviewed. Early in project planning, the jurisdictional entity should notify NDDOT and SHPO of its intent to proceed with a particular roadway improvement project. This notification should include a request to advise the jurisdiction on the applicability of Section 106, the need to identify consulting parties, and for a Class I cultural resource literature search. When appropriate, the jurisdiction should anticipate that a Class III identification effort will be conducted, including identification of archaeological, architectural, and traditional cultural properties subject to the effects of the project. When historic properties are identified, the jurisdiction should anticipate that avoidance or mitigation of adverse effects to such properties may be required. Procedures and expectations of other participants can be clarified and addressed under the terms of a Programmatic Agreement among the parties that tailors the review process to project needs.





Wetlands and Waters of the U.S.

Wetlands and other waters of the US will need to be considered for each project as the jurisdiction wants to move the project from planning stages to construction. Wetland delineations are recommended in the initial stages of the roadway improvement project to confirm the boundaries of wetlands and other waters of the U.S. within the project area and to coordinate with United States Corps of Engineers (USACE) to determine jurisdiction.

For the 2040 LRTP, the National Wetlands Inventory (NWI) and aerial photography were reviewed within the Study Area to determine potential project impacts. Many of the project alternatives cross at least one stream and were adjacent to several wetlands. Streams crossed range in size from the Missouri River (a large perennial river) to small unnamed intermittent streams. Most mapped wetlands did not span the potential alternatives of the roadway improvement projects, but were within 500 feet of roads. Because the NWI provides an estimate of wetlands based on soil type and aerial photography, these boundaries are utilized as guidance for identifying wetland areas and delineation would be required for each project.

Threatened and Endangered Species

Fish and wildlife species listed under the Federal Endangered Species Act (ESA) would need to be considered for each project. The State of North Dakota does not maintain a list of state-listed sensitive species. Consultation with U.S. Fish and Wildlife Service (USFWS) would be required to determine which ESA-listed species have the potential to occur within each project area.

All ESA-listed species in the LRTP Study Area occur within the Missouri River and its floodplains or are limited to prairie and grassland habitat. Several alternatives cross the Missouri River, potentially impacting both fish and bird habitat. Additionally, the Missouri River and the adjacent floodplains have been mapped by the USFWS as Critical Habitat for piping plover, and impacts to Critical Habitat would require ESA consultation. Grass and prairie habitat could be present throughout the LRTP Study Area, potentially impacting listed bird and black-footed ferret habitat, but those alternatives located outside of the populated central areas are more likely to cross these habitats, and therefore are at greater risk for impacting threatened and endangered species. The gray wolf and northern-long eared bat are both listed species associated with forested habitat, which the LRTP projects are not anticipated to impact. However, habitat for the northern-long eared bat includes bridges and box culverts, so projects including these structures will need to coordinate with USFWS.

Section 4(f) and Section 6(f) Resources

The Department of Transportation Act (DOT Act) of 1966 included a special provision – Section 4(f) – which is intended to protect publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites. Similarly, Section 6(f), which was created as a part of the Land and Water Conservation Act, protects state- and locally-sponsored projects that were



funded as part of the Land and Water Conservation Fund (LWCF).

Publicly owned parks and recreation areas are present within the LRTP Study Area, and several alternatives considered are located on roads that cross or run adjacent to these public areas. If the projects proposed in these alternatives receive FHWA funds, the projects will be subject to Section 4(f) consultation.

Public spaces within the MPO area that have received LWCF grant money are subject to Section 6(f) regulations. In 1966, the City of Bismarck received general funding for all City parks. Additionally in 1973, another general funding category described as Bismarck Parking Improvements was approved. Due to these two LWCF grants consultation should occur early with each project to determine the location of improvements to determine whether the park area impacted will be subject to Section 6(f) regulations. In the City of Mandan, both Fort Abraham Lincoln State Park and the Municipal Swimming Pool (Mandan Aquatic Center) are subject to Section 6(f) regulations and have the potential to be impacted by project alternatives. Fort Abraham Lincoln State Park received LCWF funding in 1970 and 1974, and the swimming pool received funding in 1971 and 1973.

10.3 AGENCY COORDINATION

When developing an LRTP, MPOs need to consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation. The Bismarck-Mandan MPO maintains a database of stakeholders for coordination and public engagement purposes. In addition to a list of interested private and public stakeholders, the contact list for the LRTP includes:

- Environmental resource agencies
- Economic development groups
- Freight interests
- Native American tribal governments in North Dakota
- Environmental advocacy groups
- Historic resource agencies
- Wildlife management agencies
- Land management agencies

These groups were sent notices during the alternatives assessment phase of the 2040 LRTP when the range of potential multimodal improvement alternatives was actively being solicited from the public and resource agencies. Resource agencies were also contacted during the public review period of the 2040 LRTP document. The list of resource agencies contacted for coordination on the LRTP is included in [Appendix B](#).

10.4 PROJECT PLANNING - ENVIRONMENTAL COORDINATION OPPORTUNITIES

In discussions with FHWA North Dakota Division staff, it was noted that there were opportunities for the MPO to enhance its early coordination with environmental agencies during the project planning phase of project development. MPO practice currently does include consideration of environmental impacts during project planning phase, and identifying potential actions to mitigate environmental impacts such as

altering transportation corridors in the planning phase. Including agency coordination with that initial environmental impact analysis would better ensure that regulation and requirement changes are better known and identified early, when the corridor study or subarea study planning phase is being conducted. Knowing these changes early allows the MPO to better identify timelines in the project schedules for permitting and meeting regulations. Opportunities for coordinating with the North Dakota Interagency Resource Team (NDIRT) during the project planning phase would benefit many projects. NDIRT includes FHWA, North Dakota Division; U.S. Environmental Protection Agency (EPA), Region 8; USACE, North Dakota Regulatory Office; USFWS, Ecological Services, North Dakota Field Office; Natural Resources Conservation Service (NRCS); and the North Dakota Game and Fish Department. This coordination would also address the MAP 21 goal to **Reduce Project Delivery Delays**.

A draft decision guide framework has been developed through the Strategic Highway Research Program 2 (SHRP2) called “Transportation for Communities – Advancing Projects through Partnerships” (TCAPP). At the time of LRTP publication, the Decision Guide is in Beta testing at:

www.transportationforcommunities.com/framework_application_kdps/21/0. The decision guide provides a summary of stakeholder / agency roles and coordination opportunities for various stages of project development. While the planning process outlined in the TCAPP decision guide are steps the MPO generally follows during project development, it is an effective reference framework for future transportation planning efforts in the MPO. The MPO should monitor the TCAPP Decision Guide process as it moves out of Beta testing and once finalized consider how the process might benefit corridor and subarea planning studies in Bismarck-Mandan.

Also noted in discussions, there may additional benefits from local agencies investigating the establishment of mitigation and conservation banks in the Bismarck and Mandan regional service areas. Mitigation banks are wetlands, streams, or other aquatic areas that have been restored, established, enhanced, or preserved for the purpose of providing compensation for unavoidable resource impacts. Conservation banks could establish dedicated habitat acreages that are utilized as banks for mitigating unavoidable impacts to the habitats of threatened and endangered species. Public agencies such as cities and counties, and private interests can sponsor establishment of these banks.

10.5 ENVIRONMENTAL JUSTICE ASSESSMENT

Environmental justice is intended to ensure that Federal actions treat all populations equally, and was introduced into federal actions and funding by the Executive Order 12898 of 1994. This executive order is founded by the Title VI of the Civil Rights Act, which prohibits discrimination on the basis of race, color, or national origin. Environmental justice directs federal agencies to identify and address the effects of its programs, policies, and activities on “minority populations and low-income populations”. For the purposes of the 2040 LRTP, environmental justice is used as a reference for ensuring equal access to transportation systems and providing additional consideration for transportation improvements and programs that benefit environmental justice populations. There are three fundamental environmental justice principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

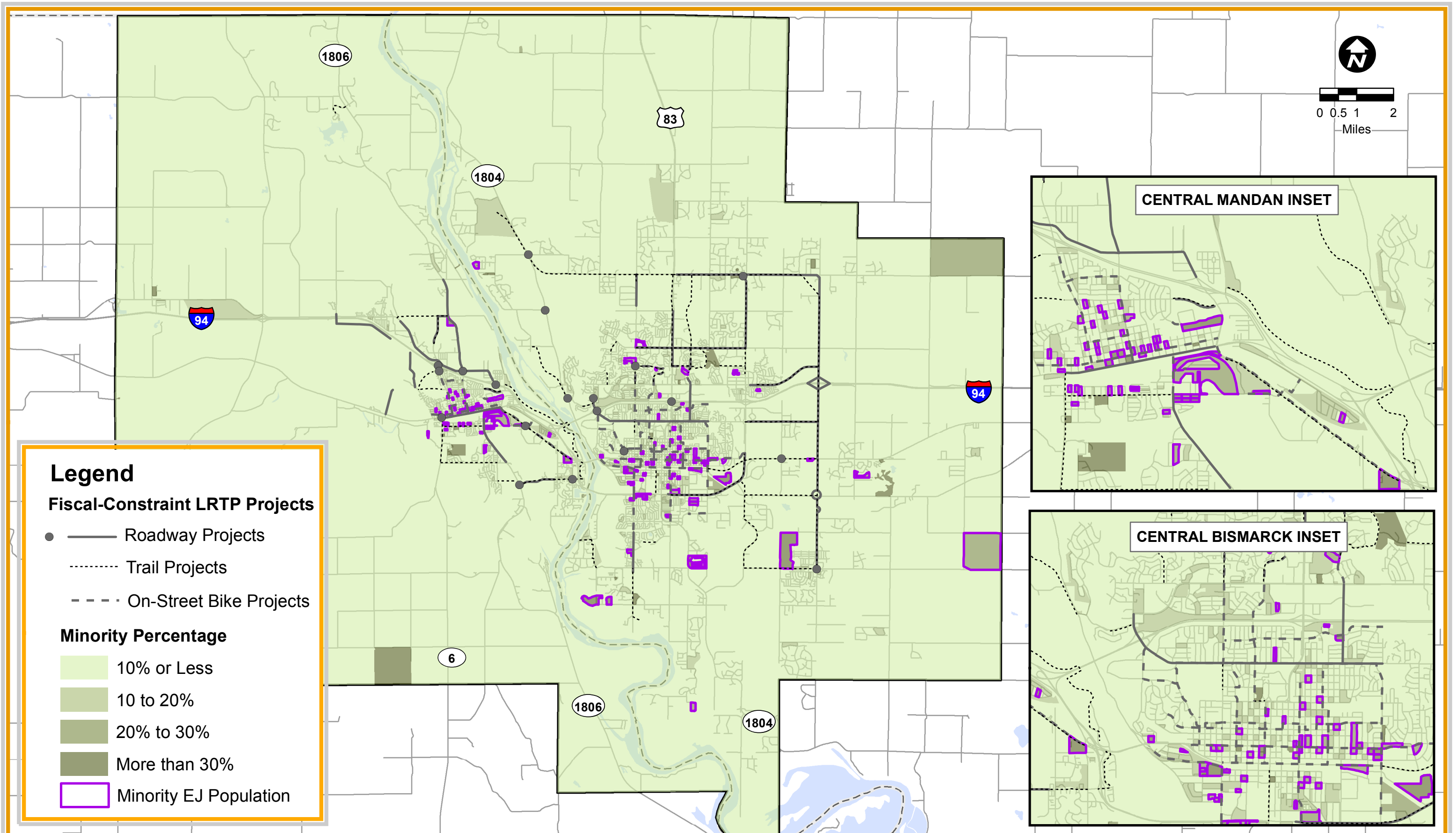
The LRTP environmental justice analysis provided here is an assessment of recommended transportation improvement projects in relation to the identified environmental justice populations. **Figure 10-2** provides a summary of the LRTP-recommended projects in relationship to the locations of minority populations.³⁰

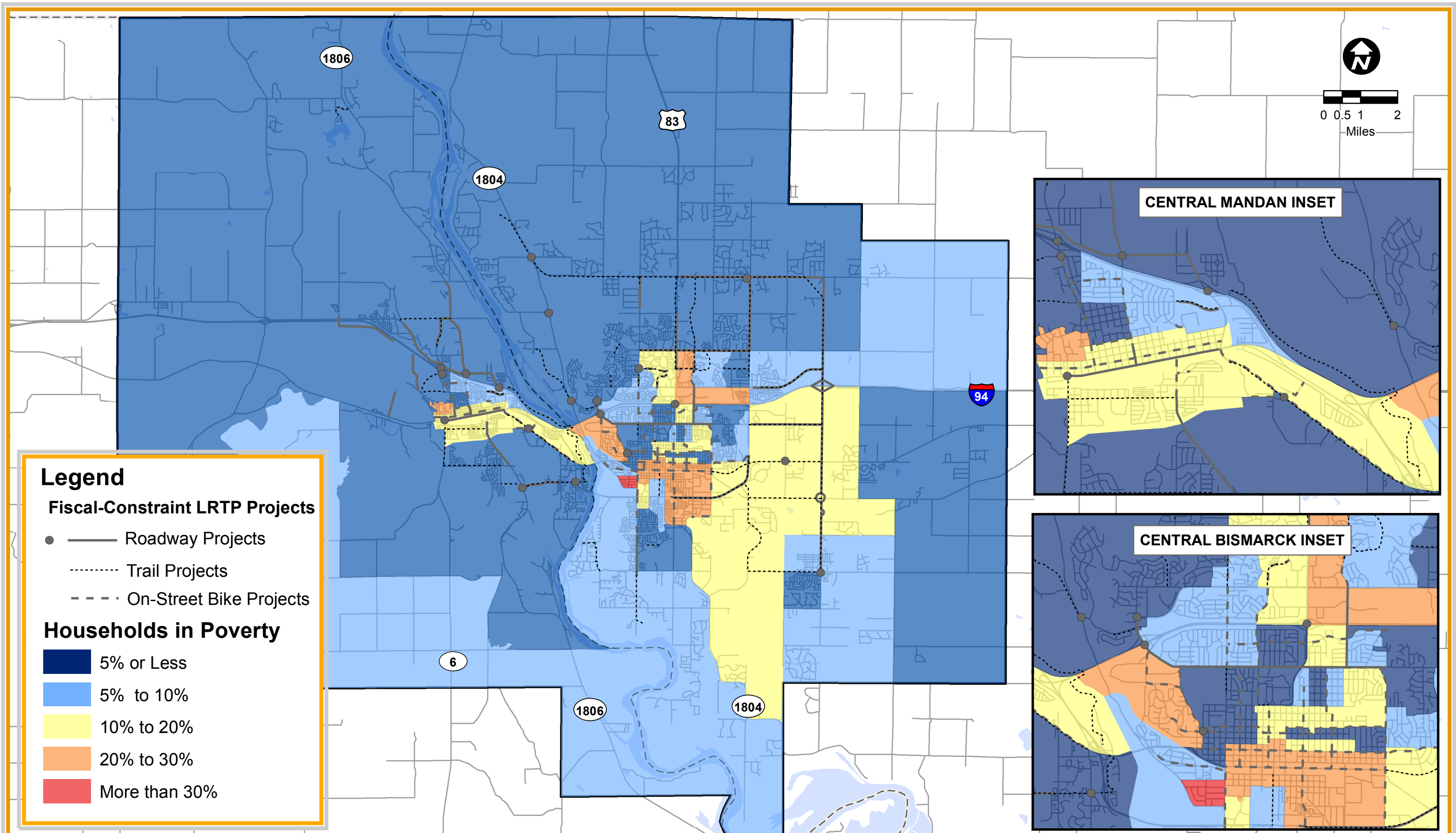
Figure 10-3 shows the LRTP-recommended projects in relationship to low-income populations.³¹

The recommended project list is relatively evenly distributed amongst environmental justice and non-environmental justice locations. Improving mobility for environmental justice populations was one of the alternatives performance measures applied.

³⁰ Based on 2010 US Census data, those blocks with at least 20% minority populations and more than 10 people in the block were identified as minority population.

³¹ The data shown are households that meet the census definition of being in poverty, based on 2008-2012 American Community Survey data at the block-group level.





10.6 SECURITY

An important part of the transportation plan is considering transportation system security. The security of the transportation system has been a required part of metropolitan transportation planning process since the passage of SAFETEA-LU transportation authorization in 2005. Security planning helps the MPO prepare to respond to events, both natural and manmade, that affect the transportation system.

The Department of Homeland Security (DHS) was established in 2002 following the September 11, 2001 terrorist attacks. The DHS includes transportation system security as part of its mission, and part of that requirement is fulfilled with the *Transportation Systems Sector-Specific Plan: An Annex to the National Infrastructure Protection Plan* (2010) is a strategic plan as a part of the National Infrastructure Protection Plan (NIPP). As a part NIPP transportation system plan, it sets forth four goals to achieve enhanced national system security:



- Prevent and deter acts of terrorism using, or against, the transportation system;
- Enhance the all-hazard preparedness and resilience of the global transportation system to safeguard U.S. national interests;
- Improve the effective use of resources for transportation security; and
- Improve sector situational awareness, understanding, and collaboration.

In recognition of those national security goals, there are several activities that the MPO undertakes to enhance the security of the transportation system. Those activities include:

- **Hazard mitigation Planning:** The MPO is currently working on a hazardous materials routes plan.
- **Coordination and collaboration with emergency responders:** The focus group on the LRTP update included representatives from emergency responders.
- **Identification of Critical Assets:** Past planning efforts have identified critical assets in the metro area, including:
 - Missouri River Highway and Rail Bridges
 - Interstate interchanges
 - Transit facilities
 - Transportation network access to key security facilities, such as utility plants, the State Capitol, and hospitals.
- **Continue to Coordinate with State and Federal Agencies:** The North Dakota Department of Emergency Services coordinates North Dakota's natural disaster preparedness, mitigation, response, and recovery activities. The agency interfaces with local agencies to support local response and serve as a liaison between federal, local, private and volunteer agencies.

10.7 LRTP CONSISTENCY WITH MAP-21 PLANNING GOALS

This section provides a summary of how the 2040 LRTP document reflects the requirements of MAP-21. There are 7 national planning goals, outlined in Chapter 2, that guide ongoing metropolitan transportation planning activities. **Figure 10-4** shows the activities and elements provided in the 2040 LRTP that fit with each of the national planning goals.

Figure 10-4. How the Seven MAP-21 Planning Factors are Addressed by the Plan

Safety <ul style="list-style-type: none"> • Identified Goal and Objectives related to enhancing and improving safety (Chapter 2) • Summarized current regional safety performance (Chapter 5) • Identified and applied safety performance measures for assessing alternatives (Chapter 7) • Identified projects to improve regional safety (Chapter 9)
Infrastructure Condition <ul style="list-style-type: none"> • Identified Goal and Objectives related to State-of-Good- Repair (Chapter 2) • Summarized current infrastructure condition performance (Chapter 5) • Identified increased levels of funding for maintaining infrastructure condition in financial plan (Chapter 8)
Congestion Reduction <ul style="list-style-type: none"> • Identified Goals and Objectives to improve system mobility and reduce congestion (Chapter 2) • Summarized current and future congestion levels at the system and corridor level (Chapter 5 and Chapter 6) • Identified projects to address current and future congestion issues (Chapter 9)
System Reliability <ul style="list-style-type: none"> • Identified objectives related to improved mobility, reduced incidents, and multimodal travel reliability (Chapter 2) • Identified ITS improvements that improve incident response capabilities and system resiliency (Chapter 9) • Identified strategies for initiating system reliability monitoring (Chapter 10)
Freight Movement and Economic Vitality <ul style="list-style-type: none"> • Identified Goal and Objectives related to enhancing freight movement and local economy (Chapter 2) • Business and Economic Development interests were represented on the focus group (Chapter 3) • Assessed current freight conditions (Chapter 5) • Identified both freight and economic assessments for performance measures for assessing alternatives (Chapter 7)
Environmental Sustainability <ul style="list-style-type: none"> • Identified goal and objectives related to environmental coordination (Chapter 2) • Mobility assessments included VMT and VHT assessments directly tied to environmental performance (Chapter 5, Chapter 6, and Chapter 9) • Provided environmental screening assessment of alternatives and selected projects (Chapter 7 and Chapter 9)
Reduced Project Delivery Delays <ul style="list-style-type: none"> • Identified objective related to streamlined project development (Chapter 7) • Alternatives assessment provided environmental review and screening of project implementation steps to streamline future project development (Chapter 7) • Identified future opportunities for enhanced environmental coordination during the project planning / corridor study phase of project development (Chapter 10)